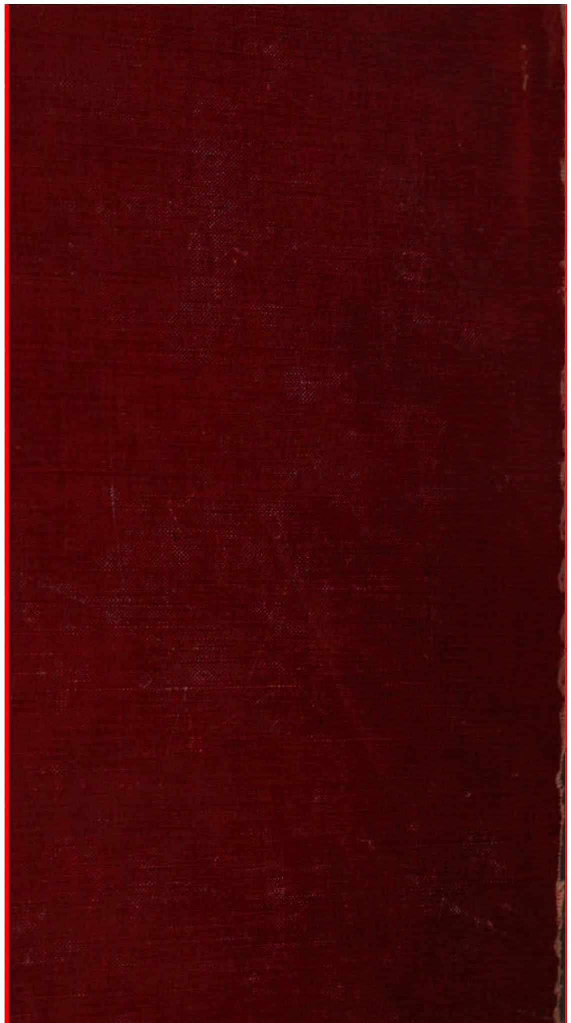

THE ARCHITECTURAL FORUM

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*Illustrated; ex. exterior; in. interior; pl. plan

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arch.
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4-7-1923

arch

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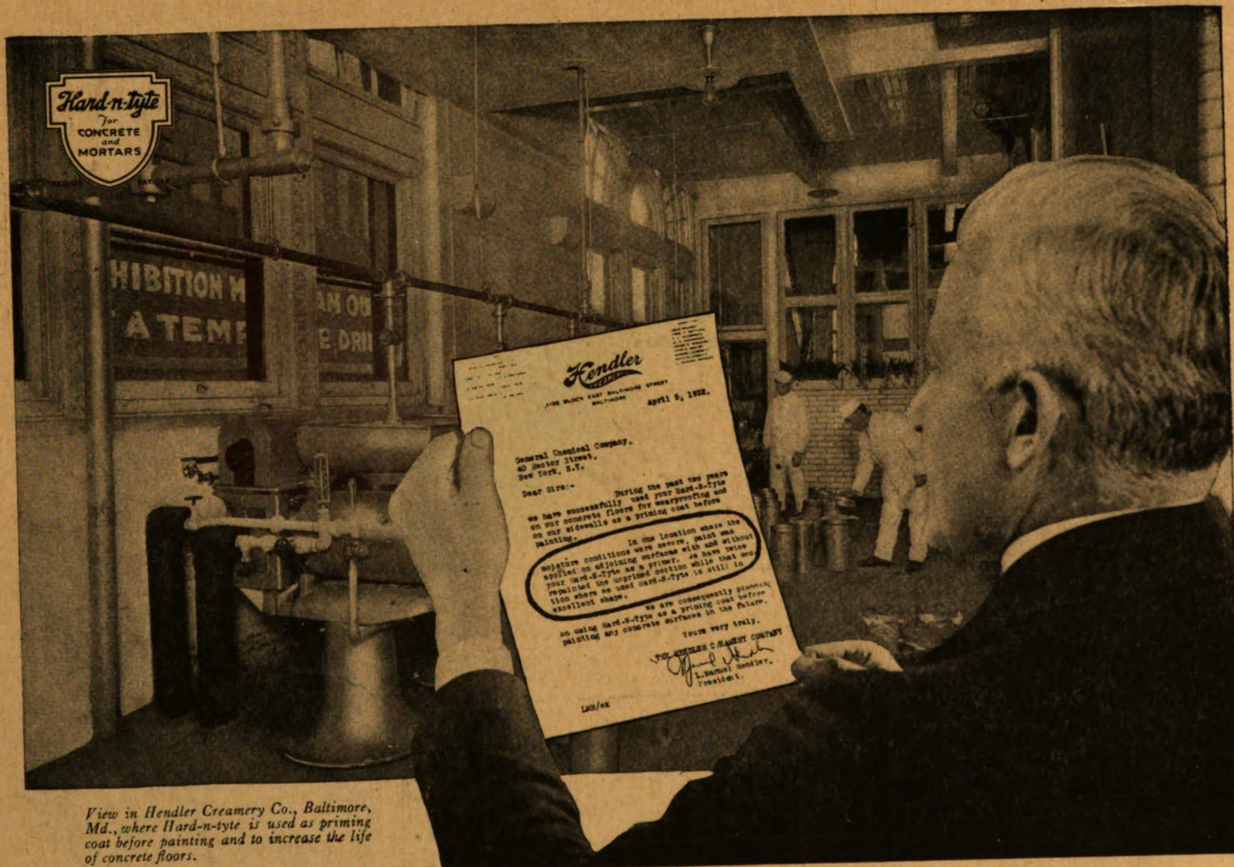
THE ARCHITECTURAL FORUM

JULY
1922

FOR GRAPHIC ACCOUNT OF BUILDING CONDITIONS, SEE SERVICE SECTION



View in Hendler Creamery Co., Baltimore, Md., where Hard-n-tyte is used as priming coat before painting and to increase the life of concrete floors.

Cut the cost of painting concrete 50% and double the life of the paint!

Read this letter from a concern that knows—from experience!

In one location where the moisture conditions were severe, paint was applied on adjoining surfaces with and without your Hard-n-tyte as a primer. We have twice repainted the unprimed section while that section where we used Hard-n-tyte is still in excellent shape.

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40 Rector Street New York City

Hard-n-tyte Specification Floors

—dustless, long-wearing concrete

THE ARCHITECTURAL FORUM

VOLUME XXXVII NUMBER 1

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LETTERPRESS

ALBERT J. MacDONALD, Editor

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Albert J. MacDonald, Pres. and Treas., S. Howard Myers, Vice-pres., Robert Sweet, Sec.

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over
Bishopric Base

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THE EDITOR'S FORUM

THE AMERICAN CONSTRUCTION COUNCIL

IT will be recalled that in the period immediately following the war the American Institute of Architects through its Post-War Committee expended effort and money in giving serious study to the organization and production of the building industry, particularly from the viewpoint of the architect. A firm conviction was reached that more constructive co-operation among the various elements of the industry was necessary to successful functioning, and the first definite step toward this goal was a conference called by the Institute at Atlantic City in September, 1920, to which were invited representatives of all interests and agencies associated with building. The result was the organization of the National Congress of the Building and Construction Industry.

The Congress involved a new conception of organization; it was not to operate for the economic benefit of any one element of the industry, but was to be an organ of service to all, giving advice following impartial study of actual conditions that would tend to eliminate friction and weld together an industry that would consider first its obligation of service to the public. Extensive publicity and large appropriations for development the Congress has not had, yet its work has gone forward and active local groups are functioning in Boston, New York and Philadelphia, and in the states of Washington and Oregon.

This new conception of organization has not passed unnoticed. Recently a movement of similar intent has been discussed in a larger and national way and has now crystallized in the American Construction Council which was organized in Washington on June 19, at a meeting conducted by the Secretary of Commerce, Herbert Hoover. Its expressed intention is to place the construction industry on a high plane of integrity and efficiency and to correlate the efforts towards betterment made by existing organizations by means of a conference association representative of the whole industry.

The organization thus parallels the National Congress of the Building Industry in its idea, and it is probable that the functions of the Congress will be absorbed by the Council if its progress is in keeping with its adopted bylaws and the general spirit of disinterested study and co-operation under which it starts.

The American Institute of Architects at its recent convention voted to become an association member of the Council and stands ready to aid in every possible way the fulfillment of the Council's desires. It merits this co-operation and approval of the Institute because its bylaws recognize the essentials of practice the Institute deems important to the success of such a body. Briefly these points are: The organization should include all the elements in the industry; it should be essentially a conference organization; its relation to its various members should be purely advisory; it should recognize the local nature of many of the industry's problems and foster local organizations of similar character and co-ordinate their activities.

The Council is unique among the many organizations that have arisen within the building industry in that it has no disciplinary powers and invites both labor and capital interests into its conferences. A very significant stand was taken by building trades labor when the Building Trades Department of the American Federation of Labor indorsed the Council and unanimously voted to affiliate with it at their recent convention.

The Council should not be the type of organization that succeeds on publicity alone; it is constituted to study the building industry from within in a scientific manner; its progress therefore must be slow, and the public and the various parts of the industry must be careful not to embarrass it by expecting and demanding superhuman results in a brief space of time. Some of the work that has been agreed upon as desirable of accomplishment and on which study and research will be expended are: a code of ethics; adequate statistics; apprenticeship systems; legislation along vocational lines; a uniform building code; standard railroad rates; seasonal employment; standardization and elimination of waste in building, and other subjects of similar constructive character.

The Council is composed of these groups, each with equal voting power: architects; engineers; construction labor; general contractors; sub-contractors; material and equipment manufacturers; material and equipment dealers; bond, insurance and real estate interests; construction departments of public utilities, and the construction departments of federal, state and municipal governments. The voting membership is confined to associations, although individuals and firms interested in construction may become sustaining members with the privilege of the floor at all meetings.

Such a body with direct representation of every function of the building industry has great possibilities for doing a vast amount of good in behalf of building. The absence of any element of compulsion places it on a high plane of idealism, yet its scheme of organization insures a practical foundation for its efforts. If the support of the industry is given the movement, there has come into existence an opportunity to achieve self-government in the building field and thus make unnecessary governmental regulation that would some day be demanded by a public that has sickened of the many controversies and lack of co-ordination so evident in the past. Franklin D. Roosevelt was elected president of the new Council.

TEA HOUSE IN THE GARDEN OF A MANDARIN'S VILLA, HANGCHOW

Situated in the middle of a shallow lotus pool, on a meandering stone bridge, this structure of three columns and triangular roof reflects its gay color among the green pads.

Photographed by Edwin L. Howard

The
ARCHITECTURAL
FORUM

VOLUME XXXVII | JULY 1922 | NUMBER 1

American Institute of Architects' Convention

CHICAGO, JUNE 7, 8 AND 9, 1922

IF at any time architects of the country entertained the thought that the American Institute of Architects was of greater value to eastern than to western men and was conducted with their interests primarily in view, surely the events connected with the 55th convention served to change any such feeling. The sessions of the convention were held in Chicago, and the traditional magnanimous and progressive spirit of the middle west was noted in the hospitality of the Chicago chapter and architects. Then again, the new president of the Institute is William B. Faville of San Francisco, who has the distinction of being the first architect from the Pacific coast to fill the chair of president. The Institute may feel equally honored, because the brilliant and constantly expanding group of architects on the Pacific coast is an active force in the development of architecture in this country, and the direct representation of these men in the councils of the Institute will encourage a broad, constructive policy in Institute affairs if the character of the work they have been doing in recent years is a criterion.

This turn of events in the Institute is but another indication of the wonderful manner in which we are welding together the citizens of this huge country of ours. When the exponents of an art so personal as architecture can come together from points 3,000 and more miles apart, representing different tastes due to widely different climatic conditions, racial extractions and cultural influences, and find common interest in ideals for public service, ethics of practice, and the maintenance of local architectural precedents, we have an exceptional example of the benefits derived from association and the tolerance and good will that emanate from knowledge of the other man's personality and work.

If there were nothing to record in the way of actual accomplishments of the convention as a body, an observant spectator would be compelled to admit that the annual gathering of chapter delegates and individual architects from all sections of the country means much for American architecture. Men come direct from the active problems of practice with ideas that are bred of local conditions uppermost; the few days of the convention, spent in the atmosphere of recreation and social contact, make possible a broader view of architecture and its relation to the affairs of the world than is possible in an office, and frequently the criticisms and objections that seemed so important at the start fall into proper perspective. The opportunity to participate in the convention sessions is open to all and acts as a safety valve; aside from this there are numerous occasions when groups of two or more architects can quietly gather to relate experiences and express hopes and ideals that are of the greatest interest and value.

In conventions of the past action of importance has occurred, and conventions of the future may stand out as milestones in the development of the profession; the Chicago convention at this time cannot be singled out as one of great importance because of any definite policies formulated or other direct action taken, but it is our impression that as a meeting of architects it was unusually successful and will be recalled in later years not alone for the pleasant circumstances, due to the choice of Chicago as the convention city, but for the influence it will exert on the work of the profession of the next and succeeding years. It is the first occasion for a number of years when architects could gather and honestly express a feeling of buoyant optimism for the immediate future of architecture and building generally, and this was of the greatest psychological value. This feeling of confidence was evident everywhere; there was no tendency, as in conventions of recent years, to complain about lack of appreciation for architecture by the public, or that utilitarian consideration has become so important that the engineer is to suffice in the direction of building enterprises. The profession of architecture is moving with steady pace toward the opportunity for which it has long waited, and one observing the convention could not fail to realize it.

Many of the delegates arrived early because of a pre-convention meeting, related to advertising, which developed a valuable point of contact between architects and manufacturers that holds promise of mutual benefit if the resolution passed by the convention, suggesting a permanent organization through a Producers' Section of the Insti-

tute, is put into effect. The Chicago architects were on hand to meet arriving guests, and an informal smoker held the evening before the convention began provided a foretaste of Chicago hospitality and promoted general acquaintance that was invaluable in creating a spirit of cordiality that continued through the three following days, culminating in the closing banquet that will be recorded as one of the most successful and enjoyable Institute affairs ever held.

The convention sessions were held at the Chicago Beach Hotel, several miles from the center of Chicago and adjoining Jackson Park and the site of the Columbian Exposition. It was a fortunate experiment and reacted to the benefit of the convention in making possible a much higher average of attendance than is usual, and was enjoyed by the delegates for the better opportunity provided for informal gatherings.

The Institute is to be warmly congratulated on its growth, the progress noted in President Kendall's opening address giving indication that within a few years the membership will be such that there can be no question of the Institute's representing in numbers the great majority of the architects of the country. There is now a total of 51 chapters, 12 of which have been formed in the last two years. The increase in membership in these two years is 1,032, making a total membership of 2,500 in round numbers. This is remarkable in the light of the depressing conditions that have surrounded architects during this period and is evidence enough of the new spirit of service and pride of accomplishment that have arisen within the Institute. It is the result of the very earnest work of chapters throughout the country, and this together with the healthy financial condition of the treasury should be a source of great gratification to the retiring president, Henry H. Kendall of Boston. Mr. Kendall enjoyed the most enthusiastic support of the officers and members during his term, and his genial personality, excellent presiding powers, ever-present good nature and his tact and resourcefulness in keeping discussion from entering troubled waters will long be remembered.

The Institute's progress has been turned over to able hands in Mr. Faville, and he carries with him into office the high regard and affection of architects in the east no less than he does of his own immediate confrères of the Pacific coast. The other officers elected are Ernest J. Russell, St. Louis, first vice-president; Robert D. Kohn, New York, second vice-president; William Stanley Parker, Boston, secretary, and D. Everett Waid, New York, treasurer. Three directors were also elected: William Emerson, Boston; Benjamin W. Morris, New York, and William L. Steele, Sioux City, Iowa. Herbert Hoover, Secretary of Commerce, was elected an honorary member, the Institute thus giving recognition to the noteworthy work Mr. Hoover has done for the building industry and the public and to his generous acknowledgment of the services of architects in matters of economic import connected with the building industry.

At the convention of last year the gift to the Institute of a fund for educational purposes was announced. The donor desired to remain anonymous, but it was a pleasure to the members to hear President Kendall recommend that the fund be named the Waid Educational Endowment Fund in honor of its donor, D. Everett Waid. The fund amounts to $28,000, and it is hoped that it will prove the nucleus of resources for the training of promising young men who enter the profession.

Two matters on which affirmative action was taken may appear simple and of but passing interest, yet they may have wide effect on the Institute's future. The first relates to principles governing practice and is indicative of the growing tendency to depend less on a rigid code of ethics and to trust more to the individual's own sense of right as a guide. Canon 11 of the Code of Ethics, which has declared that it is unprofessional "to compete knowingly with a fellow architect for employment on the basis of professional charges," was intended of course to prevent one architect's quoting a lower fee than another for the purpose of securing a commission. With the growth of methods other than the percentage basis for determining fees and in view of the procedure of reducing by fairly common consent the rate of percentage on certain types of building, such as office buildings, lofts and factories, the practical application of the Canon has involved great difficulties.

The convention voted, therefore, to remove this Canon from the Code and to substitute for it this addition to paragraph 4, "On the Architect's Charges" of the Circular of Advice:

"To compete knowingly with a fellow architect for employment on a basis of professional charges is inconsistent with the spirit of this Code."

An amplification of this statement to the effect that an architect should take reasonable steps to ascertain if other architects were under consideration by the client, and that in no event should he depart from any special standard of charges for the purpose of underbidding some competitor, was a part of the original resolution. This was removed from the resolution before it was passed, but is referred to here to indicate the spirit in which the change was made. The principle is now entirely clear, and its application is left to the determination of the individual according to his own conception of correct practice.

The second matter relates to Institute membership. By action of the convention and on the recommendation of the Committee on Survey of Institute Methods, a new class of membership, open to recent graduates of qualified architectural schools, was created. This is a membership at large, the men in this class not being affiliated with any chapter; all graduates and such special students as have certificates evidencing satisfactory completion of studies from their dean or faculty are

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AMERICAN INSTITUTE OF ARCHITECTS BANQUET
OLD FINE ARTS BUILDING, CHICAGO, JUNE 9, 1922

The setting under the dome of C. B. Atwood's Fine Arts Building of the Columbian Exposition was distinctly architectural and served to focus attention of both architects and public on the efforts of the Illinois chapter to restore this excellent example of classic architecture for the edification and use of the public. The rotunda was beautifully arranged as a garden under the direction of Paul Chalfin. The lofty interior glowed with rose light reflected from the dome, and the approach to it from the portico under moonlight through the dark colonnaded lobby presented a picture that will remain long in the memories of the guests.

eligible to membership within a period of two years from graduation or completion of their courses. The membership is designated as Junior Membership with the affix, "Junior American Institute of Architects." The privilege of such membership expires automatically when the member reaches the age of 30, by which time it is assumed he will have been affiliated with a chapter and have secured full membership. The annual dues for junior membership have been placed at $5, so that no financial burden is involved. This interest of the Institute in the annual output of the schools from which the architects of the future are recruited is to be highly commended. It will be of value to the young man in bringing to his attention early in his career the Institute standards and will likewise provide a boon for the Institute in that the enthusiasm, ideals and optimism of youth will be available in carrying on the organized activities of the architectural profession.

Only two subjects brought out extended discussion because of differences of opinion. The work of the Small House Service Bureau, which is under Institute guidance and provides service at low cost in the design of small houses for those people who would ordinarily not be able to have architectural advice, is questioned in some sections because of alleged discrepancies between the method of organization and recognized local legal procedure for the practice of architecture; in some other sections enthusiasm for the idea is lacking because of a feeling that the plan interferes with the activities of younger architects who are dependent on this type of work for their living. The Bureau has been operating long enough to prove the need for its services, and in those sections where activity has been the greatest the contention that it supplants regularly practicing architects has not been borne out. In response to suggestions from Illinois it was voted as the sense of the meeting that it would be desirable to identify each plan by the name of its designer, instead of following the present practice, representing it as the joint work of the members comprising the Bureau.

The subject of Jurisdictional Awards and the policy of the Institute in being an active party with the American Federation of Labor in the adjudication of such disputes brought out a general discussion following the presentation of the report of the Institute's committee charged with the details of the work. The discussion was interesting as an indication of the way in which local opinion changes as conditions change; there was a direct reflection of the feeling in different cities on the closed *vs.* open shop question, and a reflection of an evident failure on the part of those criticising the Board of Awards to recognize that their present fortunate conditions in which the control of building operations has been wrested from organized labor is of but recent origin and that they hold no guarantees for maintaining their position through a period of building prosperity when the old law of supply and demand is known to upset the most carefully laid plans. We hold no brief for the closed shop, but it is our opinion that a factor of such importance as the Jurisdiction Board, which offers a positive means of alleviating evils in communities where conditions have the possibilities of being the worst, should not be overthrown because temporary and localized advantages arise. The difference of opinion really arises through misunderstanding of the application of the plan. Since jurisdictional disputes can only occur in communities where building conditions are governed by organized labor rules, the awards of the board can apply only in unionized territories. Open shop and American plan communities do not recognize labor's claim to make rules, and accordingly any adjudication of counter union claims cannot even be applied in principle. Those architects working under conditions other than those laid down by labor should be satisfied to count themselves fortunate and be happy to give countenance to any method or rulings that will alleviate conditions in localities not so fortunately placed. This and a few other minor points on which discussion developed were passed over without inconsiderate action being taken, the opposition in each instance being satisfied to conclude the issue with its dissenting opinion placed on the convention record for the board's consideration.

With a note regarding the approval of the Institute in the aims of the American Construction Council, which is a new national body organized along lines held essential to success by the Institute, and the unanimous vote of the convention directing the Institute to become an Association Member of the Council, the points of chief importance have been related.

In arranging the convention program effort was made to find more time for the consideration of matters bearing particularly on the phases of architecture as an art, in response to suggestions made at previous conventions that the inevitable business routine be relegated as far as possible to the board of directors. Much of the more or less rambling discussion recalled in previous conventions was eliminated by the simple expedient of establishing a resolutions committee which effectually disposed of well intentioned but frequently extraneous suggestions.

The provision for group lunches with scheduled speakers for each day was a pleasing innovation, and the talks were well varied with wit, art and business. In reviewing the convention, some of the Chicago architects regretted that all of the speakers were Chicago men, but this we are sure arises from architects' proverbial sense of modesty. The delegates came to Chicago to appreciate its progressiveness and to hear from its leaders in the profession. The Chicago architects are not accused of thinking that all art and practical considerations of architecture derive their leadership from the Lakeside City, although they have many admirers who would gladly claim this position for them.

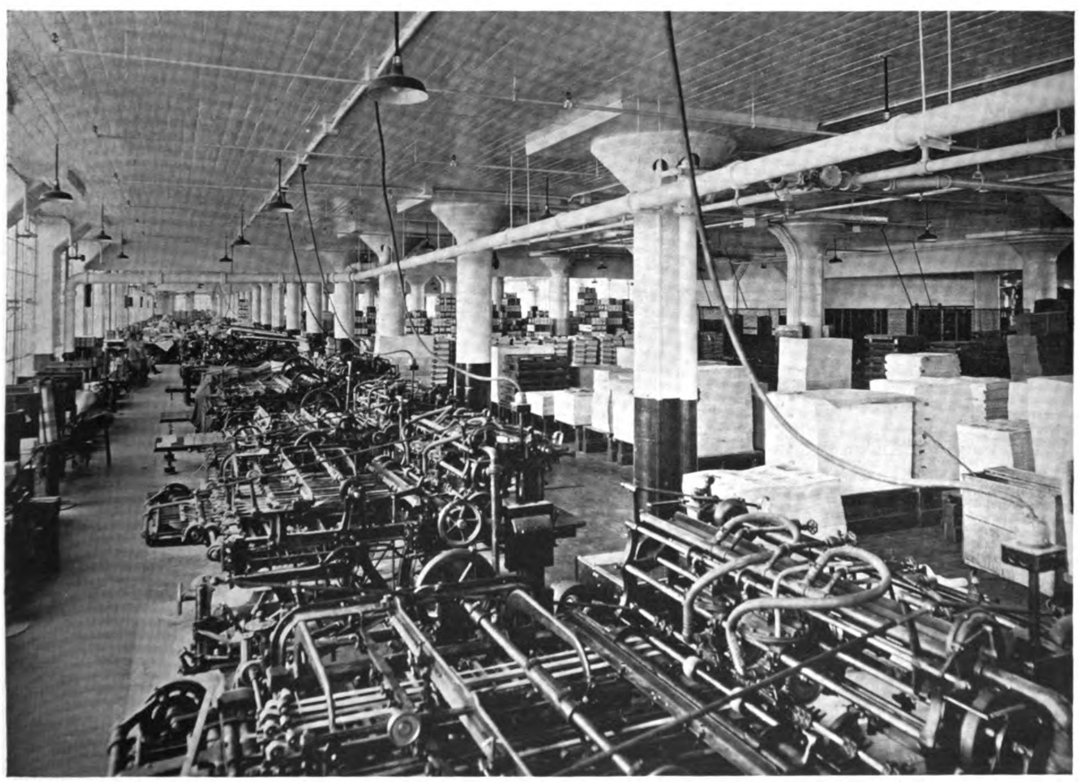
The Modern Publishing and Printing Building

By GEORGE NORDHAM, A.I.A.

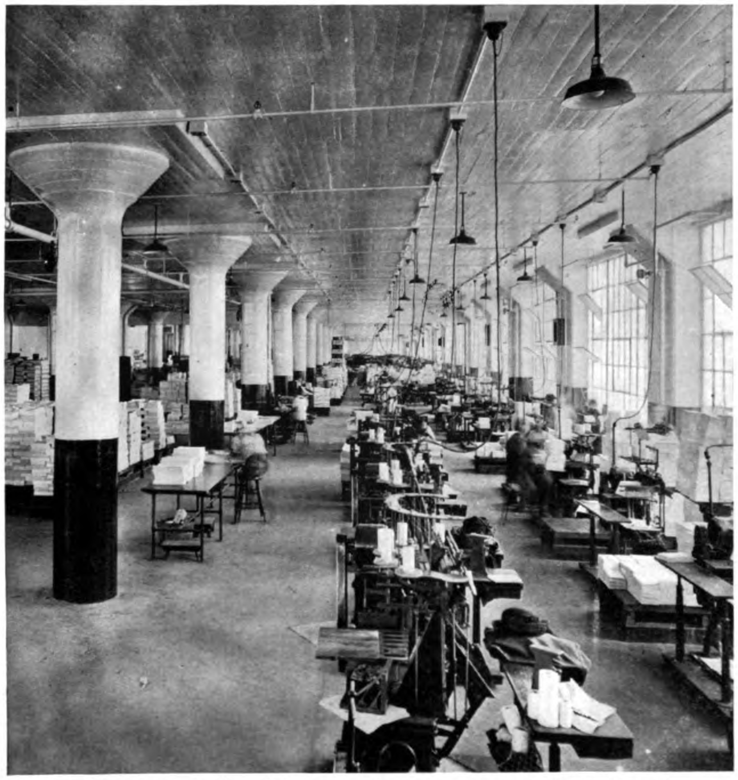
IMPROVEMENT in the design, construction and equipment which recent years have brought in business structures of every kind is particularly marked in buildings devoted to manufacturing purposes, and in no part of this broad field is the improvement more marked than in structures intended for printing establishments. The day has passed when an architect's duty was performed when he had provided four walls and a roof as a shelter for equipment which fulfilled every utilitarian function, all this given an aspect in which architectural appearance counted for naught. The larger and more important the modern printery the more certain is it to be planned and built with an eye to its appearance and to the comfort and contentment of those who work therein. Equally important, however, is its practical function, and an effort is made here to outline the best possible design, layout of plans, materials, construction and other details of a structure for the carrying on of a publishing or printing establishment.

The essential requirements of a modern publishing house are economy of operation in the handling of materials and freedom from fire hazard. It should also present an appearance of dignity and be generally suitable for an industry which possesses noble traditions and is closely allied to the liberal arts. The size of the appropriation for building naturally affects the result, and there are other considerations such as location, size and arrangement which will give the highest degree of efficiency, lowest cost of maintenance, greatest safety for employes and freedom from interruption of business, best light, ventilation and sanitary conditions, all of which must receive careful study. There should be kept constantly in mind:

1. Processes of publication, machinery, apparatus, etc.
2. Kinds and quantities of material used in raw and finished products.
3. Number of people employed in the plant, and their accommodation.
4. A carefully studied and logical arrangement of various departments and machines, so that material during manufacture is handled a minimum number of times.
5. Consideration of a possible future extension to the building and planning so that in case of



View in Pressroom of Metropolitan Printing Plant, Long Island City, N. Y.
D. Everett Waid, Architect



Machines in the Bindery of the Metropolitan Plant Are in the Outer Bay with Center Space for Storage

the ultimate success of the plant is the plan layout, which will locate the machinery in such a way as to best suit the particular case.

The Material of the Structure. The material selected must be chosen with several considerations in view. It would be absurd to say that, for example, a brick and steel structure is the best for all cases. The size in area and height, financial limitations, etc., are really controlling factors, but whatever be the amount of the appropriation the result must be the best and most suitable building which can be had. For one-, two- or three-story buildings, mill construction of the slow-burning type is often desirable and it is comparatively inexpensive. For a building up to six stories reinforced concrete is as good; it is fireproof and more bulky and is, therefore, a good shock absorber. Good structural designing may even consider a concrete building up to eight stories in height, but the columns become so large and closely spaced in the lower stories of such a building that this type is less desirable than some others.

such building it will not be necessary to move machinery or to interrupt business.

Location and Type of Building. In the selection of the site several important items should be considered: the healthfulness, light, railroad facilities which involve the receiving of paper and other printing materials, coal, the mailing of magazines, express, telegraph and telephone facilities, etc. Locations that are remote and inaccessible are inadvisable because difficult for customers and employes to reach.

Of all kinds of buildings, the ideal plant, from the standpoint of operation, is probably the one-story building, its area being as large and well lighted as possible. The method of operation in this type of building may be considered as direct, that is the raw product (the paper) would come in at one side of the building and the finished product (books, magazines, etc.) would be shipped away at the other. The general rule might be that buildings of large area and few stories are more desirable than tall buildings small in area. The building should be as nearly fireproof as possible. There are always large quantities of paper, oil, etc., in the structure, and a fair percentage of the increased cost may be met by the lower insurance rate if the building is as nearly fireproof as possible. Brick or tile partitions should naturally be used in preference to partitions of wood.

The most important consideration, however, in

For a tall building, brick and steel construction is probably best as the frame ties the building together and columns may be placed farther apart and be smaller in size. Possibly a composite structure—that is one built incorporating various materials in different acceptable parts—would be the proper solution.

Plan and Arrangement. As an approximate guide this method of floor arrangement, departments and their sub-departments is suggested, the sizes of all rooms and parts being left to the architect to determine according to the needs of his particular client and the amount of space at his disposal.

The basement should contain boiler rooms, engine room for dynamos, pumps, etc., a waste paper room with baling apparatus, a stock room with shelves, thoroughly dry storage rooms for paper, a general storage room and a plate vault to store plates for future use. There are cases where it is desirable to plan a separate building for a power-house where the area of the plant permits.

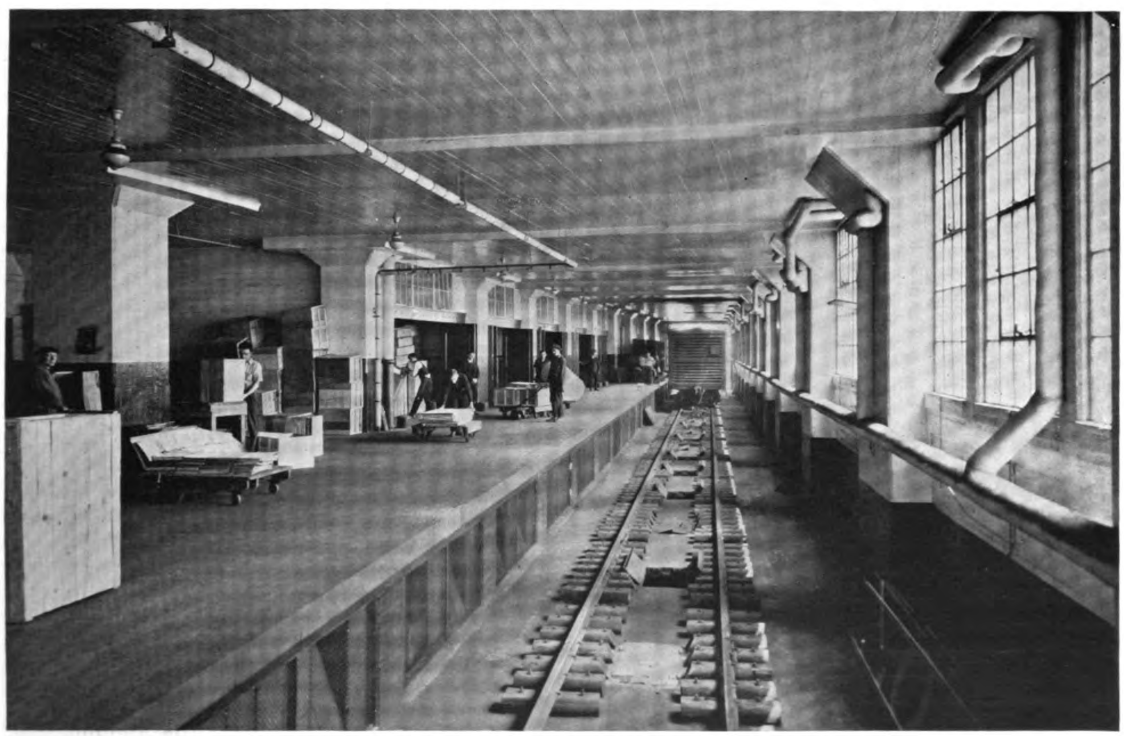
The first story should contain entrances and elevator lobbies, and a large general locker room divided for men and women for all departments, with watchmen and watchwomen on continuous duty. Between the entrance lobby and general locker room should be a time clock for the recording of entry and exit of employes. The employes' entrance should be apart from the customers' entrance. Adjoining locker rooms, men's and women's

toilets, receiving, shipping and mailing departments should be installed. A receiving department should be at one end of the building and a shipping department at the other end if possible, but both may be confined to one space if the building is small in area. The planning of the receiving and shipping departments will depend in a large measure on the transportation facilities which will be chiefly employed. Where railroad service is to be used the building must be planned with reference to switching facilities, and if the plant be sufficiently large there may even be several switches into the building which would of course greatly simplify the receiving and shipping problems. Care should be taken not to interfere with the different directions of traffic, and floor levels should be arranged so that wagons can back up to a platform, level with floor of wagon and main floor, the driveway being pitched to accomplish this if necessary. Stock clerks' rooms in receiving and shipping department will be necessary. Provide at receiving and shipping departments a lowerator and dumb-waiter to basement. Ramps should be provided whenever floors are on different levels. If the building is for a newspaper or a general publishing firm, necessary offices or salesrooms should be placed on the ground floor for public convenience.

A mailing department should be placed as near the shipping department as possible. This is particularly necessary in cases where shipping is done by mail as well as by freight or express. In case the building is intended for the use of newspaper publishers and much of the shipping done by fast mail, the mailing room should connect with the platforms which hold the automatic "mail arms" from which mail bags are gathered by trains running at full speed.

Location of Pressrooms. The pressroom floors should be as near to the ground as possible to reduce vibration. In this department there should be the various presses, plate and roller rooms. If the ceiling is high a smaller room with a mezzanine for these may be considered. Men's toilets with a spy window for foremen to prevent loafing should be near the pressroom and sometimes women's toilets, as women are at times employed to take sheets from delivery of presses. Supply room and foreman's office should be in conspicuous locations. Some publishers might prefer to have the pressroom in the basement, in which case it may be surrounded by daylight; this would also eliminate vibration and lower the live load of the upper floor upon which it would otherwise be located. An ink room should be provided with an ink grinder, and include shelves for storage of cans of ink.

Arrangement of Office. The office division should be placed where the employes may benefit by the light, preferably on upper floors of the building, and may include various private offices, general offices and public spaces. There will also be offices



Shipping Platform of Metropolitan Printing Plant, Long Island City, N. Y.
Note separate entrances to individual tenants' shipping rooms

for cashier, various editors, a vault for valuables, rooms for advertising manager, business manager, general manager and foreign department, a filing room with a table, photographic room with dark room, art editor's and illustrating studios, sample room, subscription department, stenographers' rooms, bookkeeping department, etc. Provide also for a general conference or reception room.

If general locker rooms are undesirable on first story, enough individual lockers should be placed in each department. Each department should have a stock room if necessary, placed centrally but not occupying valuable daylight space. Luncheon facilities serve to keep employes contented. Time is saved and employes may be able to secure food at lower prices than at outside restaurants, and the revenue from this department, if properly managed, may interest the concern. Reading and recreation rooms are also desirable, and should be separate for men and women. The machinists', electricians' and carpenters' rooms are sometimes located in the basement, but this is not to be considered as the best practice as they should be located more centrally in the building for immediate call and should have plenty of daylight. A general medical aid room should be provided, and it should be complete with first aid kits, physician's sink, cabinets, etc. It should be partitioned off for men and women, with several beds in each room. Sometimes there should be a room for the nurse or matron, and in the larger establishments examining and operating tables are provided. A medicine closet with first aid kit should be set in each foreman's office.

The press department being nearest to the source of incoming paper, the remaining departments might adjoin in the order listed: make-up rooms, composing room, folding department, bindery, mailing department, foundry and photo-engraving room.

Vibration. This is the arch-enemy of printing buildings. A printing house should be as free from vibration as possible and a solid building, standing well under heavy shocking strain, makes the best solid foundation for machinery, while a building massive in character and construction serves as the most efficient steadier and stiffener possible. Vibration in the building slows down the machinery and throws it into "tune" which will ultimately rack the machinery apart. When the machinery stands on a solid foundation; viz., substantial building, the machinery may be speeded up, thereby giving a greater output to the plant.

If photographic work is done in the plant it should be remembered that time exposures can only be made in a steady building, and practically all photographic work done in the building is time work.

The Spacing of Columns. By spacing of columns to permit the best machinery layout the efficiency of the building is increased. There is considerable difference of opinion in regard to the ideal spacing of columns. Undoubtedly the size of the plot or building really controls this subject, but there are certain good principles it would be advisable to follow. The spacing of the presses in a large measure determines the spacing of the columns. They should be spaced mainly with the consideration of placing presses in width between columns rather than considering the length of the press between columns. The main operation of the press by the men is on the side, and they will have to get from one end of the press to the other to keep account of all the different parts.

When one press is placed in a bay, with truck passageway alongside of press, columns may be spaced from 15 to 17 feet on center if convenient. If two presses are placed in a bay without truck passageway, columns may be spaced from 20 to 25 feet on center. It need hardly be said that in placing the presses full regard must be paid to the sources of natural and artificial light. The plan should make possible the full utilization of every source of light.

Floor Loads. A suggestion for the live loads is given: the pressroom floors from 300 to 400 pounds per square foot; due allowance should be made for the storage of paper to supply the presses as soon as the press is ready, and this is included in these figures; the bindery floors for 250 pounds, the foundry 350, the composing room 250, shipping wing 400, offices 60, storage rooms from 120 to 250 as required, and roof 40 pounds.

Ceiling Heights. The height of the machinery should be ascertained, and the necessary space for operation between its uppermost part and the ceiling, while in use, arranged for. Generally the pressrooms, especially those with the high type of press, require the greatest ceiling height. The foundry should have rather a high ceiling for the quick upward escape of gases from the machines. Where ceilings are made of unusual height to accommodate presses the use of mezzanines may result in economy of space in certain parts of the building where no presses are to be installed. Due consideration should be given to the projection below the ceiling of vent ducts, sprinkler devices, waste paper chutes, etc.

Walls and Their Finishes. To finish interior walls they may be painted white. When walls are to be plastered and painted or enameled white, generally the plaster is brought to a smooth finish.

White brick on the inside eliminates the cost of painting, is neat in appearance, can be washed down for cleaning and is indestructible. At columns the white brick may be considered as fireproofing, thereby eliminating the usual brick, tile, or plaster and paint. Brick would be better than plaster, owing to possible vibration in the building. In many instances plaster has proved undesirable as it may fall off and drop into the machinery, especially if applied to the ceiling; therefore the best surface is some material that is part of the wall itself. Rooms in the basement, if important, such as dynamo room or superintendent's office if located there, should have walls finished with a white

General Office Space in Shaw Building, Chicago
Note excellent light from saw tooth windows
D. H. Burnham & Co., Architects

enameled brick or white glazed tile up to the ceiling, a white tile floor and a white enameled ceiling.

Chutes for Rags. It is deemed advisable to have a sheet iron chute, about 20 inches in diameter, on the *outside* of the building for the deposit of waste rags. This should be made so that the vertical sections lap over the lower sections to let the rags slide over without catching, or else to have a flange type of lock joint.

On each story there should be a fireproof self-closing door and frame, the door about 20 x 30 inches high and 3 feet, 6 inches above the floor, the frame to connect with a branch chute of sheet iron connected with the main chute. At the bottom of the main chute there should be an inclined slide to a fireproof room in the cellar where rags are baled and made ready for shipping. Firms willing to assume a heavy fire risk have these rags deposited in metal cans on various floors, then carried to the elevators and taken to the basement and finally shipped out. This is an expensive and dangerous method.

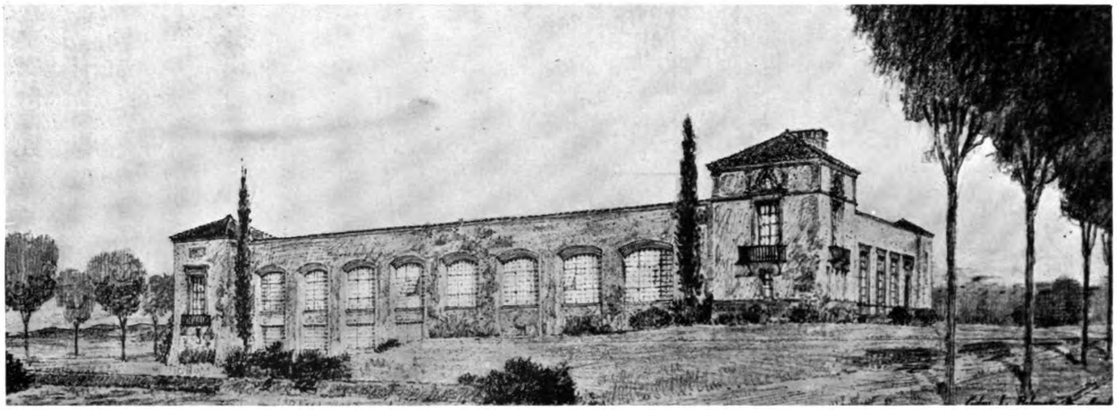
Waste Paper Chutes. Chutes for waste paper should be installed, preferably two, one for white paper only and one for colored or mixed paper. They should extend from the top story down into the baling pressroom in the cellar. They may be of the suction or of the gravity type. The client may desire to have all the paper, white and mixed, go into one chute, not caring to bother with the separate method. In the sale of waste paper, clear white paper brings much more than mixed, and this difference in price would amount to something in a large plant at the end of a year. The main chute, running vertically through the building, is usually about 3 x 4 feet or may be round. The walls may be constructed of brick or hollow tile and the interior lined in sheet metal, the horizontal joints of which should be made so that the upper sections extend over the lower sections to permit the paper to fall without catching.

The main chute should have an opening on each floor, also of sheet metal, built with the bottom inclined about 45°; the opening should be about 2 feet, 6 inches above the floor, with a cover about 2 feet, 6 inches square, arranged with a fusible link so that when the cover is left open fire in the building will melt the link and automatically close down the cover; this entire branch should be kept within 20 inches of the face of the wall.

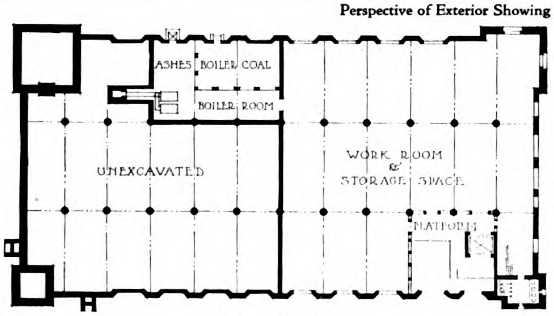
Flooring. After considerable investigation it has been found that, of the many floor surfaces, wood is the best from the standpoint of vibration, shock absorbing and wearing qualities. Cement finished floors are usually squared off with expansion joints, and when a truck with iron wheels for conveyance of paper rides over these joints, the impact in time will crack the cement and it will break up, leaving the floor in bad condition. The use of special surface finishes over cement makes a better surface than bare cement, but will not prevent the cracking. Cement finished floors are hard on the feet of workmen and have a slowing down effect on the men. If a cement finish is used it should have a sanitary cove base at the walls and around columns of about 2-inch radius.

The regulations of some cities require that benzine, gasolene and other highly inflammable oils be placed in cans kept outside of the building. This may be done by building a sheet iron compartment in the wall under a window to set the cans into, with one or two sheet iron self-closing doors. This will project beyond the face of the wall and should be made waterproof.

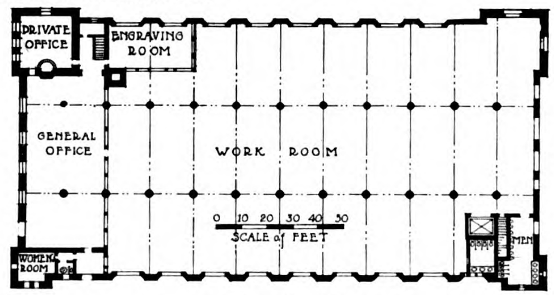
Elevator and Conveying Facilities. Elevators, dumb-waiters, etc., whether for the handling of freight or people, should be located so as to elimi-



Perspective of Exterior Showing Adaptation of Building to Grades



Basement Floor Plan



First Floor Plan

Printing Building of Arthur Thompson & Co., Baltimore, Md.
Edward L. Palmer, Architect

nate interference with machinery and use of floors. In the older type of publishing building, elevators to serve both the handling of freight and the passengers were customary. Separate freight and passenger elevators are far better and are now in general use.

On each floor, especially in the bindery and the pressrooms, overhead carriers with trolley, electrical or hand operated on a steel beam attached to the ceiling construction, should be installed. This will facilitate the moving of paper to the platforms without the necessity of using the hand truck.

Electrical Power, Lighting and Vacuum Cleaning System. The subject of power, its transmission and distribution, to be readily applied is too wide for comprehensive treatment in this limited space. It is generally advisable to use the power furnished by the local power company rather than to install the expensive machinery necessary and to incur the expensive upkeep of the individual power plant. Many firms have locked the doors of their power rooms and are using power from the electric company.

Telephone and Telegraph Facilities. Certain forms of publishing depend very largely upon the telegraph and telephone as means of securing news. If these utilities are very important they must of course be adequately provided for, and rooms be arranged for telephone apparatus and operators of the telegraph and wireless systems. Here may also be the switchboard for telephone service between the different departments. Telephone booths should be placed in convenient places, particularly in the pressroom or wherever else noise might make the use of the telephones difficult. Provision should be made for at least one or two "slot" telephone booths which are wholly separate from the telephone equipment of the rest of the building.

Generally the different machines in the pressrooms, binderies, monotype and other necessary rooms have individual motors which should be set on iron frames firmly attached to the machines so that there will not be different motions of floor and machine which would impair the working of the machinery. Provide for "pits," if necessary under machinery, and install several portable lamps under the press frames to be used for examination of working parts, and have individual switches for these on press frames. Provide an electric meter on each floor to keep a check on the power consumed.

Branch lines from the main line to the motors, controllers, telephones, etc., should be in metal pipes under the finished flooring. On the surface the exact location of these lines should be indicated by driving metal tacks or nails several inches apart if the flooring is of wood, and if the floor is of concrete very shallow holes should be bored. This will assist if the line has to be extended or altered.

If the building is tall, the installation of one or more continuous electric shafts housing the main floor switchboards is advisable; the high power main lines should be screened off for safety, and the

shaft should be built with incombustible walls. Inserts and eyelet holes for hangers on ceiling for electric pipes, etc., should be embedded in floor construction during the process of building.

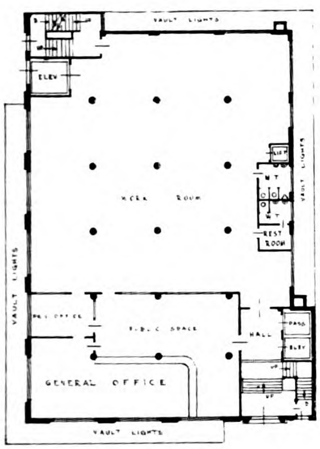
Lighting. This is a subject upon which different opinions exist. If the ceiling is flush, the indirect system is good, each fixture being fitted with a 200-watt nitrogen lamp; the spacing of the fixtures should allow about five watts per square foot of floor area. For semi-indirect lighting, use a fixture with opaque reflectors or globes having about a 100-watt nitrogen lamp. Over the delivery ends of the presses use a 300-watt lamp.

Where color work is done the lamps over the delivery end of the press and over the foreman's examination table should be of the daylight type, throwing a bluish ray which usually shows the different color effects better than the ordinary lamp. Arc lamps with carbon sticks have been found undependable. In the machine shop, carefully locate lights over the machinery in such a way as to benefit the workers the most; the selection of the proper reflector is also very important.

Circuits. Circuit-breakers are more desirable than switches, since to renew a fuse on a blow-out is expensive. Each press or machine should be on an individual circuit to prevent loss of time in stopping other machines. Lights over presses and machines should be on single circuits for the same reason, and lights under press frames should also be on individual circuits.

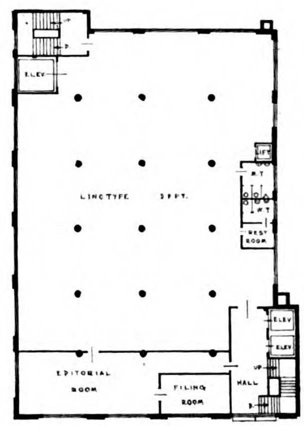
For recording provide indicating meters and gauges for light and power, assembled in the building superintendent's office or in the electrical room in the basement to afford complete supervision of operation and to give a general check on the efficient performance of equipment and the cost of the service.

The Vacuum Cleaning System. A vacuum system is undoubtedly the best method of keeping the building, machinery, etc., clean, as sweeping only raises and distributes the dust and the floors are seldom mopped. A main system or rising line should be installed with outlets on each floor, all

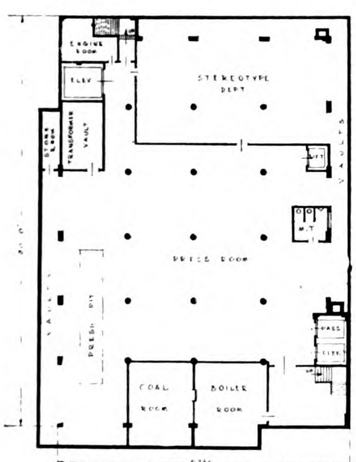


FIRST FLOOR PLAN

General Exterior View



SECOND FLOOR PLAN



BASEMENT PLAN

"Star" Building, Long Island City, N. Y.
Edward Hahn, Architect

located conveniently. The different machines may be cleaned in detail by the use of this apparatus when the machines are not running.

The Plumbing System. At the leader head a type of sliding box or joint with laps, etc., should be built, otherwise a possible continual quiver in the structure will rip the box from the roof proper. This is a source of much annoyance and expense in many buildings now in use.

At the soil and vent lines, a sliding joint should be used. The copper or galvanized iron flashing built into the roofing should follow up the side of the pipe for about 18 inches and there have a slip sleeve, and from this point up to the joint in the pipe, all well connected and watertight. This will give two sections of metal, the upper tightly fastened to the pipe and the lower tightly fastened to the roof with the upper section overlapping the lower for the water to drip off.

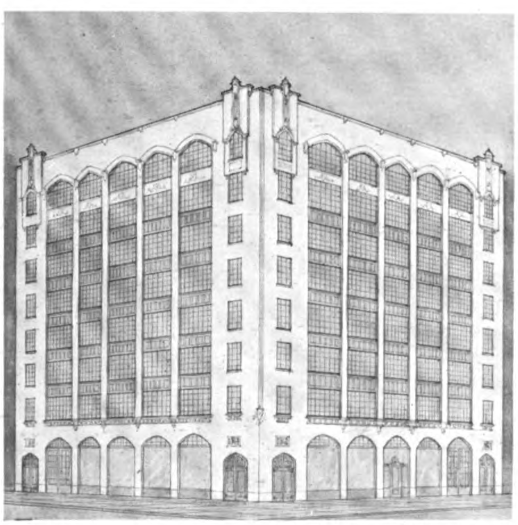
The foundry and photographic departments have, as waste, dangerous acids which should not be sent down an ordinary cast iron line, as the acid will eat through the joints in a short time. A suggestion may be to install an earthenware tile pipe approximately 5 inches in diameter with long tube with composition of wax or asphalt in the joints; this main line should have a horizontal branch line with pitch of ½ inch per foot to branch through floor to fixture in the foundry above. For this, place in the cellar a clean-out box, also to act as a trap and to be placed in the horizontal line, just before it enters the house sewer. Tile pipe has been acceptable for the vertical runs, but the vibration of the building usually disturbs the joints in the horizontal runs, causing them to open. Several buildings have the acid line of a special metal capable of withstanding the effects of acid. The joints are of couplings and asbestos rope.

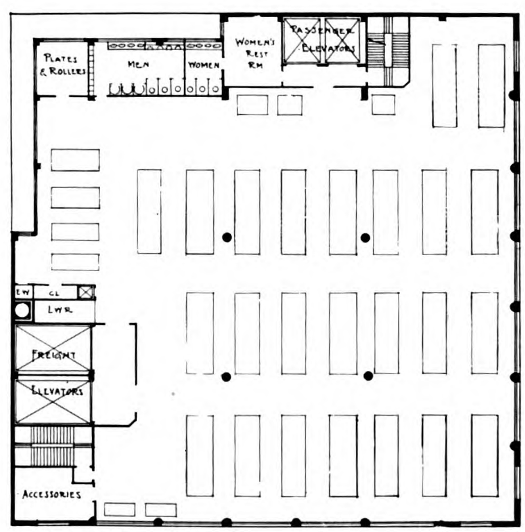
Temperature Control. It is essential that the temperature of the pressrooms be uniform at all times, not entirely for the comfort of the workers but also because of the curious effects that changing temperatures have on paper, ink and presses. Varying humidity is a serious condition because of the effect on the paper, especially while being printed and later when sheets are bound.

Heating, Cooling and Ventilation. This is a special subject, beyond the scope of this article, and should receive very thorough study for each case. Desirable heating systems are: steam, vapor vacuum, or hot blast type using fans and coils and ducts. The latter type is recommended as it saves floor space, but it is more expensive than the other types. Locate the boiler flue outside of the building if possible, so as to eliminate the uneven temperature caused at the place where the flue would be located. Where the heating and plumbing pipes pass through the floor construction, they should have metal pipe sleeves and extend about 4 inches above the finished floor surface, secured to risers, to serve as dams for accumulated water.

Probably the best method of controlling the atmospheric conditions and eliminating drafts is to keep the windows shut and have ventilating ducts with inlets and exhausts on each floor. This system will be found satisfactory at all seasons as the air supply can be heated for the winter and cooled for the summer. The locations of the main inlet and the main vertical ducts depend entirely on the plans, conditions, etc.

Painting. Avoid the use of paint as far as possible in the rooms holding machinery, this being a source of annoyance in many plants. To obtain a clean effect, the use of a reliable good white glossy enamel may be considered, the glossy finish being preferable to dead or dull finish as it reflects light.





Exterior Study and Floor Plan for Printing Arts Building, New York
George Nordham, Architect

Three Recent Printing and Publishing Buildings

A GREAT variety of structures are used for different branches of the publishing and printing business. In some instances such buildings house merely the activities concerned with actual publishing, while in other cases publishing is merged with the carrying on of the necessary manufacturing operations, such as printing, binding, etc., and a structure designed to accommodate all these allied departments. There is also a wide variety in the design of buildings intended to be used for printing and publishing.

THE METROPOLITAN PRINTING BUILDING, LONG ISLAND CITY, N. Y. With some 25,000,000 policyholders, the volume of printing required by the Metropolitan Life Insurance Co. has already reached a tremendous volume. To provide for its increasing business the Company has erected this five-story building which it will ultimately occupy entirely, space being now rented upon ten-year leases to tenants, printers, binders and engravers who can, when necessary, supplement the Metropolitan's own plant.

The building occupies a triangular plot, the area of a typical floor being 65,200 square feet. Excellent light is had from all sides, and in addition the interior is lighted by an open court about 66 feet in length on its longer sides. Each of the tenants is provided with a moving and shipping booth for freight moved by vehicle or by railroad, this latter service being made possible by a siding from the Long Island Railroad, which runs into the building. Underneath the railroad tracks and truck entrances are placed the coal bunkers, filled from railroad cars or auto trucks by the use of hoppers. Since the building has been erected upon marsh land it is supported upon concrete piles—some 3,000 in number. It is a reinforced concrete monolithic structure, with the exception of the spandrel walls under windows which were cast later, and is of fireproof construction throughout. Column construction is of the "mushroom" type, ranging in size from 4 feet in diameter in the basement to 1 foot, 8 inches in diameter in the upper story; the bays average 20 x 24, center to center. Floors in general are planned for a live load of 250 pounds per square foot. This type of construction permits of unbroken reflecting ceiling surfaces, giving excellent diffusion of light.

Hand Composition Room, Metropolitan Printing Building, Long Island City, N. Y.
D. Everett Waid, Architect

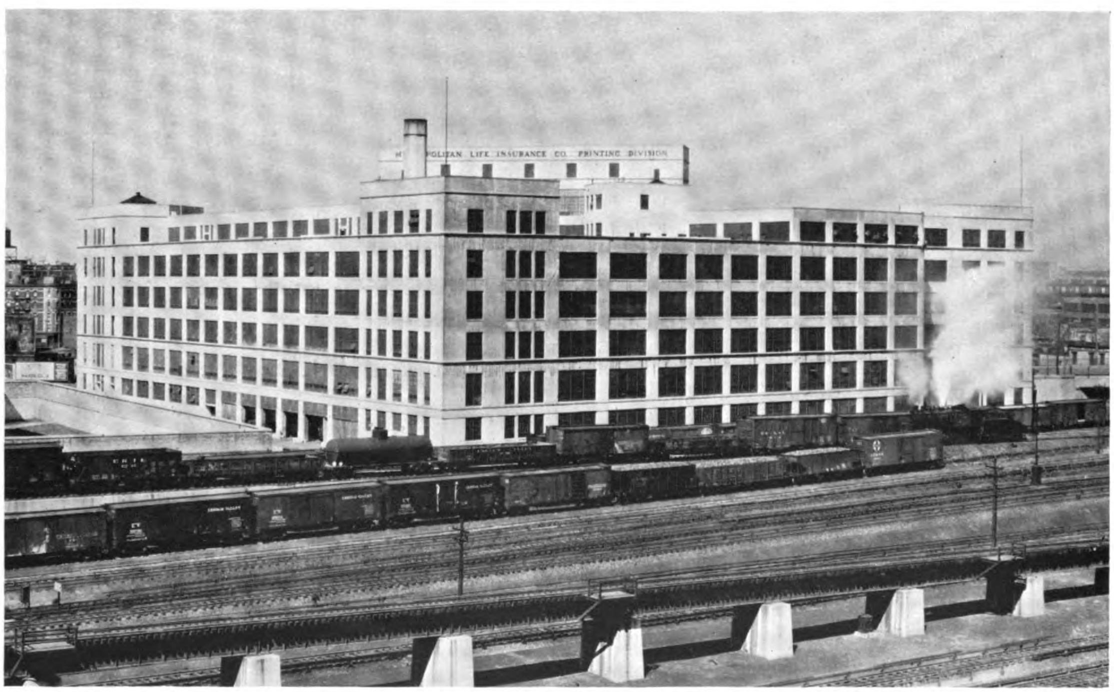
Shipping booths, siding platform and truck entrances, together with a large portion of the second floor have a floor finish of asphalt 1¼ inches thick; other floors are finished with a 1-inch Portland cement finish, laid directly on the slabs after they were cast. This method of flooring gives a much better completed floor than would be possible if finished integrally with the slabs; it admits of greater progress during construction, and the floor is more easily removed in case of necessity.

This structure is served by seven direct-connected combination passenger and freight elevators, one having capacity of 12,000 pounds with speed of 100 feet and the others a capacity of 7.500 pounds with 200-foot speed. In addition to this equipment there are two plunger elevators between basement and first floor serving tenants, and one electric elevator between basement and second story serving the Metropolitan. Each car is equipped with electro-magnetic control with reversing switch operating automatically by various safety devices and by excessive drop voltage; the cars are equipped with an automatic leveling device which aligns the platform of a car to within ½ inch of the floor, and with annunciators and trip recorders and they are separately metered in order that maintenance costs of each may be determined. All gates are equipped with positive electric interlock, preventing movement of the car until gates are closed thus barring accidents.

In accordance with the Metropolitan's well known policy as to the planning of water tanks, the house tank (15,000-gallon capacity) and the sprinkler tank are placed in a penthouse. The sprinkler tank has a capacity of 30,000 gallons, the upper 5,000 gallons being reserved for standpipe service. Wash-up sinks and slop sinks generally are combined in one battery about the center court; wash-up sinks are generally double (usable from both sides) and equipped with spray nozzles for economy in use of water. Drinking fountains are of the two-stream type and are placed at four points in each story. No urinals are provided, water closets designed to take their place having open seat with extended lip; flushometer control is by foot action.

Steam for heating the building and for the hot-water heater and high pressure steam for power are supplied by four portable type boilers of 200-horsepower capacity, one being held in reserve for emergency use. There is also a smaller boiler for summer use. This system is supplemented by feed and vacuum pumps, return and separator tanks, oil separator, etc. All the radiators are controlled by thermostats, and radiators in offices have modulation control valves.

Electric current supplied to this building is 13,200-volt service, 3-phase, 3-wire, 60-cycle. This is transformed within the building by four transformers to 220-volt, 3-wire, 60-cycle for power, and by four additional transformers to 110–220-



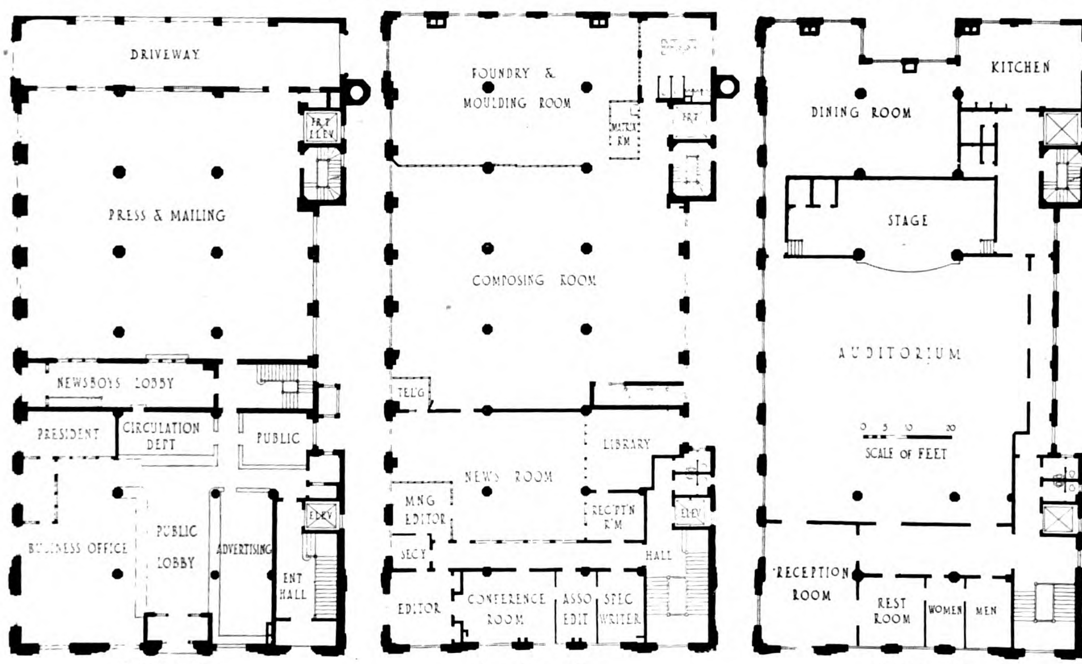
Rear View of the Metropolitan Printing Building, Long Island City, N. Y.
The location adjacent to tracks of Long Island Railroad permits spur track directly into building for shipping purposes. Coal is supplied through hoppers direct from cars

volt, 3-wire, single-phase, 60-cycle for light, one transformer in each case being held in reserve as a spare. Feed lines rise at three central points in the building, each distributed to three points in each story from which the tenants run power lines to the various presses and machines; light distribution panels are located in the same columns. For its own space the Metropolitan uses semi-direct lighting, one fixture in each panel, and in addition capped outlets are provided for the use of drop cords for press lighting. Charging equipment has been provided with outlets in each trucking entrance for charging service vehicles and trucks.

View in Bindery Showing Excellent Light in Working Spaces, Metropolitan Printing Building

This structure has the lowest insurance rate on tenant manufacturing buildings in greater New York. The sprinkler system is 2-supply automatic, under closed current electrical supervision. In each story there are four fire alarm stations equipped with 10-inch gongs. Shipping booths and other places exposed to danger of freezing are protected by a dry pipe system. The architect is D. Everett Waid, who retained as consulting engineer W. S. Timmis who designed the mechanical equipment, and John Derby as consulting engineer on fire protection, including the sprinkler system.

The A. W. Shaw Company Building, Chicago. In planning this structure it was desired by the architects, D. H Burnham & Co., to give it an appearance of dignity since it occupies an entire block frontage in what has always been a prominent residence district. With the exception of type composition, all the mechanical processes necessary for publishing are carried on elsewhere, so that this



First Floor Plan Second Floor Plan Third Floor Plan

"The Tribune" Building, South Bend, Ind.

E. R. Austin, N. R. Shambleau, Architects; G. B. Wiser, Associate

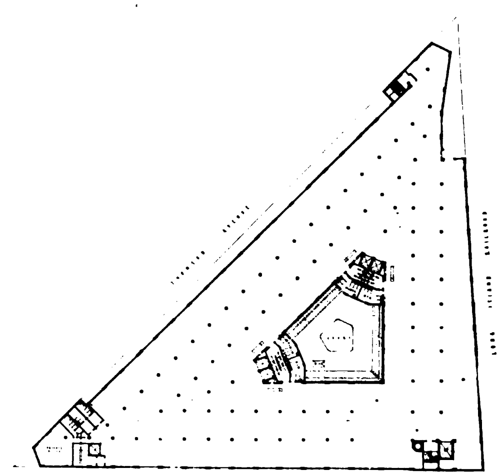
building is intended to be used almost exclusively for executive offices. The structure, two stories in height, has been planned with a view to future enlargement by the addition of a third story. The structure is fireproof throughout.

The exterior walls of the building are of brick, with Indiana limestone facing for the three street fronts. Large windows, facing four directions, are a feature of the design, and to afford additional light for the central portion of the upper floor a system of sawtooth skylights has been introduced which floods the entire working space with light without producing sun glare. In the basement are the heating and mechanical plants. Upon the first floor, in addition to the vestibules, entrance lobbies, stairways, check rooms and toilets for employes, are arranged the departments which need not be in close proximity to the executive offices.

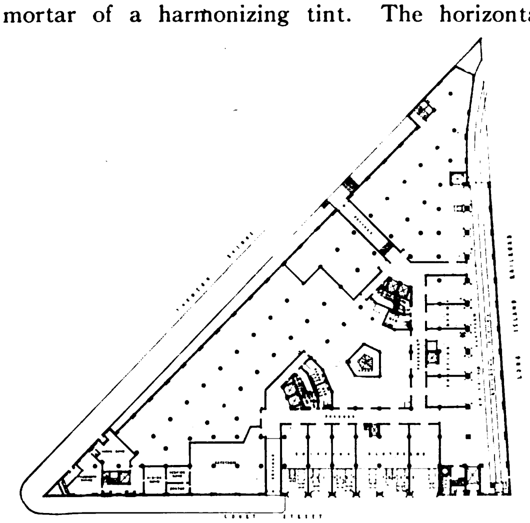
Upon the second floor are the private offices, situated at one corner with the editorial and art departments at one side and the executive offices and library at the other. The remainder of this floor is occupied by the advertising and sales departments and other clerical divisions, by employes' toilets and check rooms and by a luncheon room and kitchen where the employes are given excellent service at moderate cost. The building was completed in July, 1920, at a cost of 29.5 cents per cubic foot.

"THE TRIBUNE" BUILDING, SOUTH BEND, IND. This structure, designed by E. R. Austin and N. R. Shambleau, with G. B. Wiser as associate architect, is an excellent example of a publication and printing plant for a daily newspaper. The dimensions of the structure proper are 75 x 144, but the basement extends under the 15-foot sidewalks upon two sides, providing space for the storage of 1,000 tons of paper. Upon a base of unpolished gray granite are the concrete and steel walls, faced on the two street fronts with brick of a reddish brown color laid in mortar of a harmonizing tint. The horizontal joints are raked out and the vertical joints left flush with the brick surfaces. Exterior trim is of terra cotta of a color to match the granite base. Window trim and the metal panels between the windows of the second and third floors are of bronze and of a verde antique color.

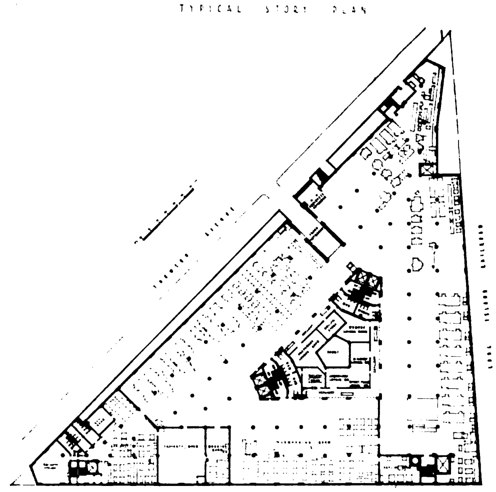
Built throughout to be eventually six stories high, the design permits the construction of the present three stories and yet maintains harmony and a sense of architectural satisfaction and proportion. The floor of the stereotype room, where beams and slabs were used in construction, was planned for a load of 500 pounds per square foot; floors of the composing room are built for 300 pounds, office 100 pounds, and in other parts of the building floors are planned for loads of 150 pounds. For the main press, which weighs 60 tons, a reinforced concrete foundation has been supplied, constructed independently of the building, and at one side of the press is a concrete and steel foundation which carries the 75-horsepower motor operating the press.



TYPICAL STORY PLAN

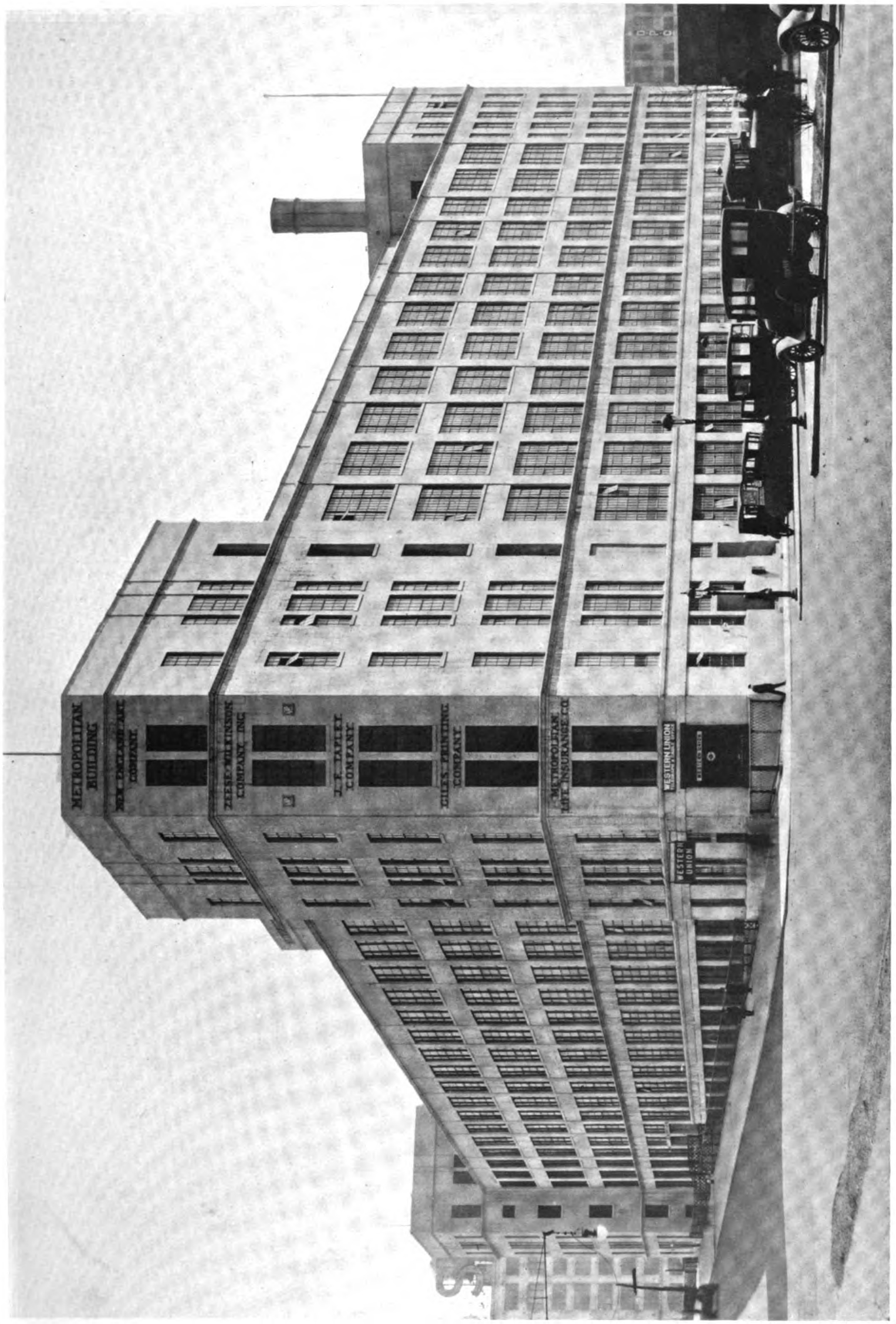


FIRST STORY PLAN



SECOND STORY PLAN

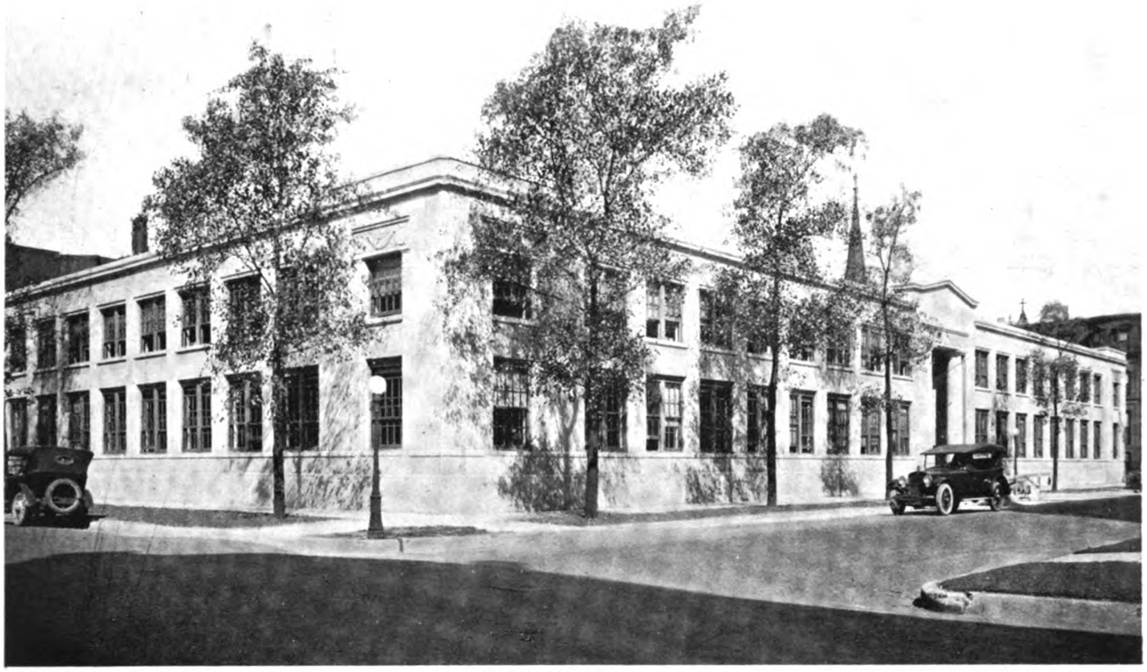
Metropolitan Printing Building, Long Island City, N. Y.



GENERAL VIEW

PRINTING BUILDING, METROPOLITAN LIFE INSURANCE COMPANY, LONG ISLAND CITY, N. Y

D. EVERETT WAID, ARCHITECT

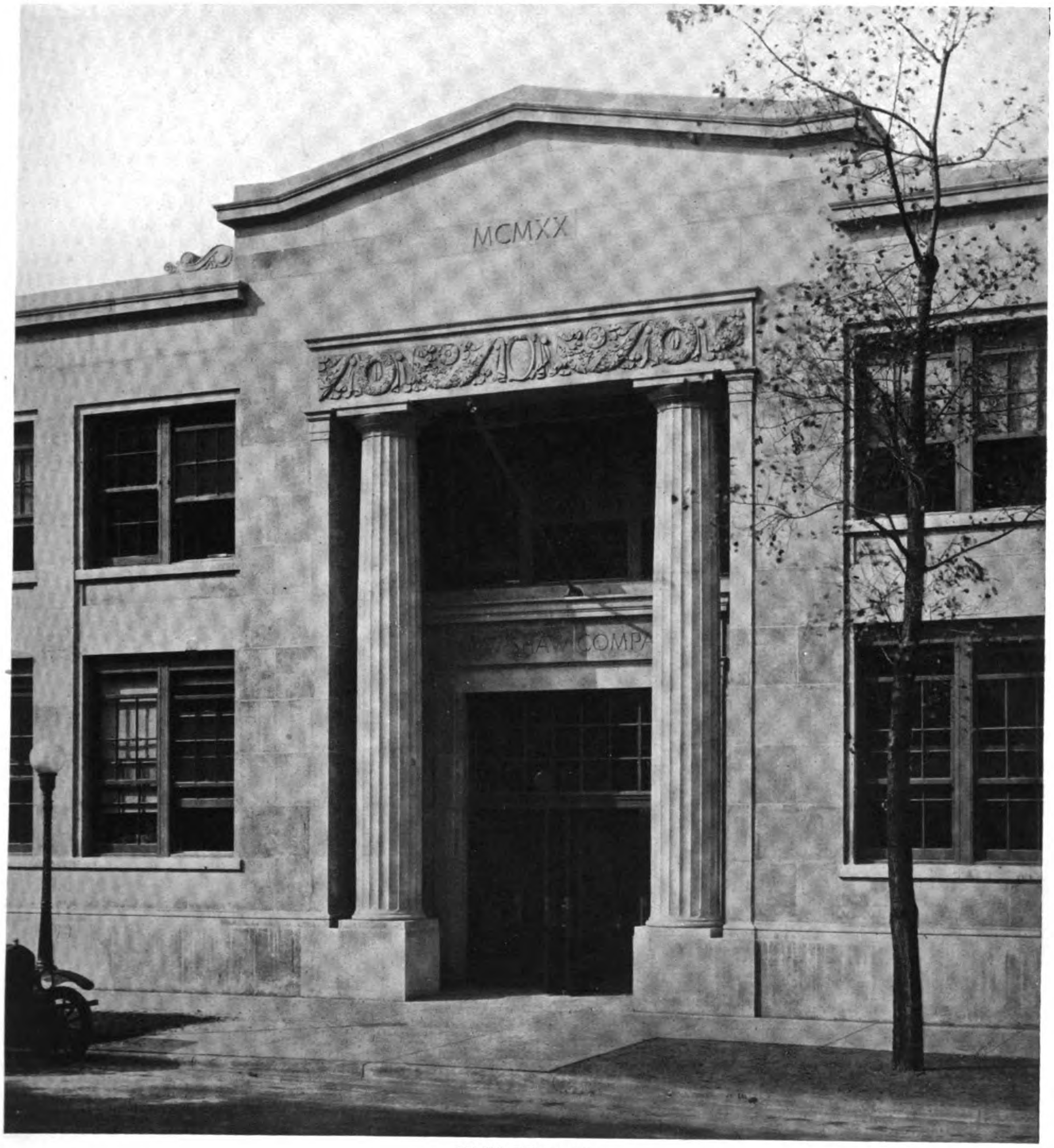


GENERAL VIEW

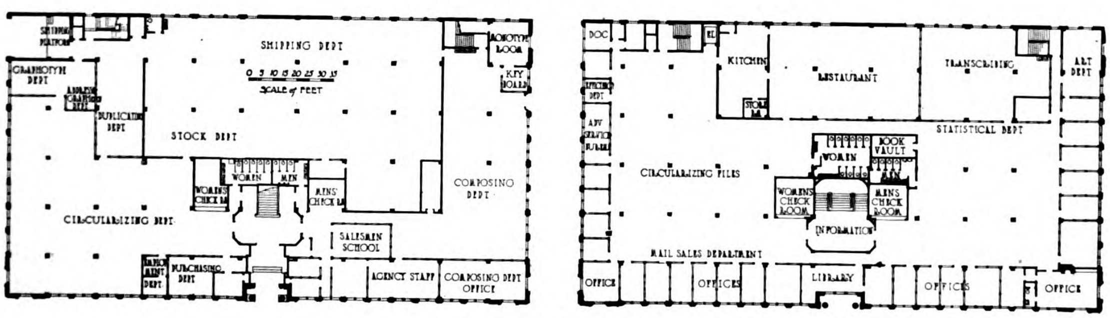
PRIVATE OFFICE

PUBLISHING PLANT, A. W. SHAW COMPANY, CHICAGO

D. H. BURNHAM & CO., ARCHITECTS



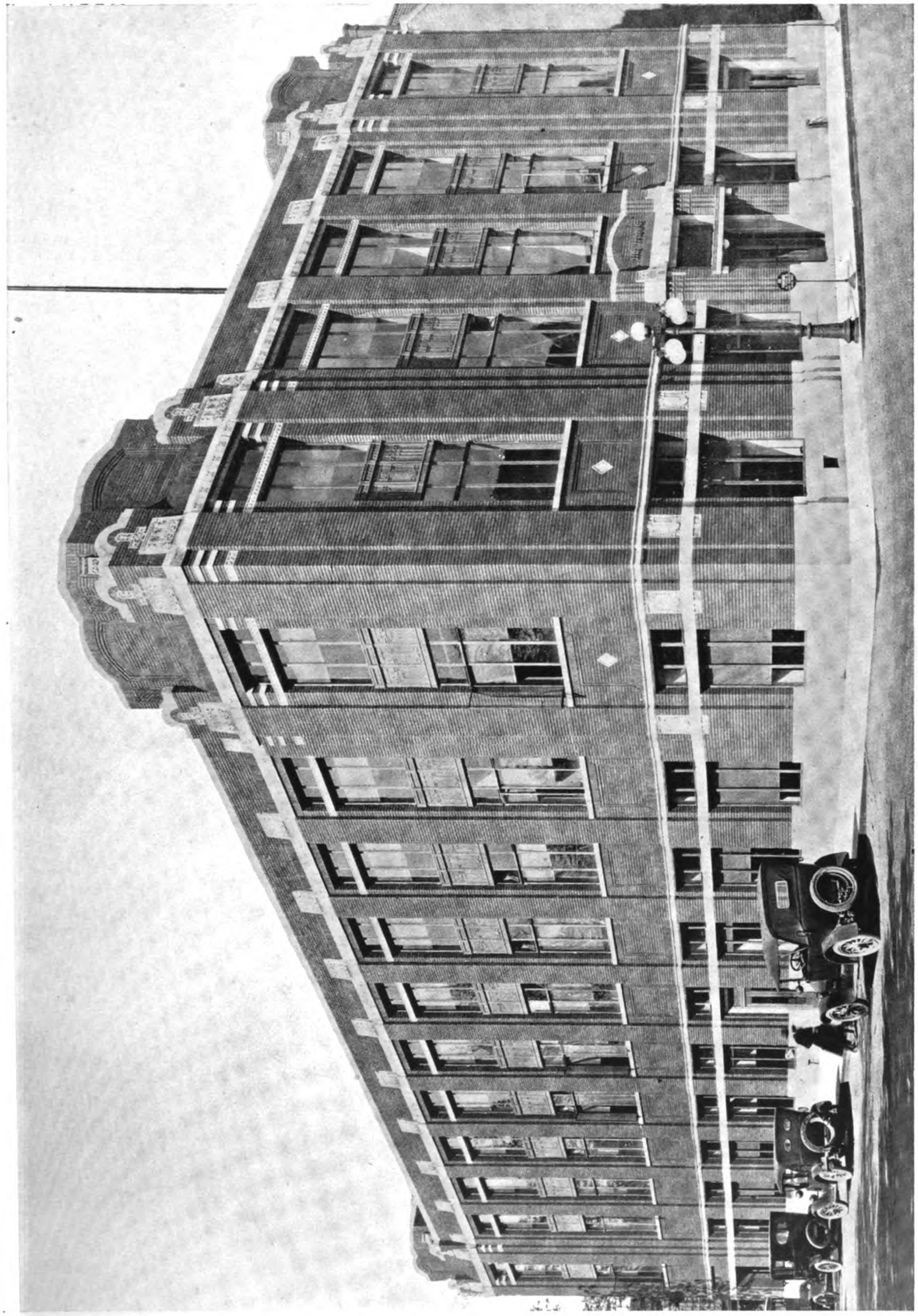
MAIN ENTRANCE



FIRST AND SECOND FLOOR PLANS

PUBLISHING PLANT, A. W. SHAW COMPANY, CHICAGO

D. H. BURNHAM & CO., ARCHITECTS



GENERAL VIEW

"THE TRIBUNE" BUILDING, SOUTH BEND, IND.

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BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

The Co-operative Ownership of Apartment Buildings

I. METHODS AND PRINCIPLES OF JOINT OWNERSHIP

ABOUT two years ago several articles were published in THE ARCHITECTURAL FORUM on the subject of co-operative ownership. These articles developed an unusual response, indicating the interest of architects in this subject. As the result of the information provided in these articles and in the answers to numerous inquiries several projects of this nature were actually constructed.

The Editors have recently received a number of further inquiries on this subject. In view of this interest and the fact that there have been a number of interesting developments since the original articles were presented, it is proposed to present a series of three articles covering the subject as adequately as possible. The first of these articles is presented herewith and the following will complete the series:

2. *"The Promotion and Financing of Co-operative Building Projects."*

3. *"Recent Examples of Successful Joint-Ownership Projects."*

Inquiries are invited from architects interested in the development of co-operative apartment buildings, and a special service is offered to readers for suggestions regarding specific problems.

ONE of the interesting outgrowths of the housing problem which developed in the larger cities of the United States during the recent reconstruction period has been the revival and broadening of interest in the subject of co-operatively owned multi-family dwellings. Co-operative ownership (or joint ownership, as it is sometimes termed) is not a new idea, but it is only within recent years that its application has been developed along broad lines in this country.

This idea originated long ago in European countries and became particularly popular in Germany and in France. At sporadic intervals co-operative building was attempted in this country, but in the early years of this activity it usually failed because of the lack of proper organization and because the operation was based too strongly on congeniality and the human equation. Gradually, however, such apartment buildings were developed, particularly in New York, so that during the last two decades hundreds of such buildings have been built and financed and successfully operated, but they have caused little comment, until at this time of increased interest in the co-operative idea a more careful analysis of what has gone before is being developed.

On investigation we find that 40 or 50 years ago apartment buildings, particularly of the studio type, were developed in New York and have been operated successfully on the co-operative basis ever since, one structure being of particular interest in that it still has tenants who were original purchasers in the stock of the building.

Co-operative ownership means merely that instead of a group of unconnected individuals' renting portions of a building, a group of persons wishing building space of a certain kind are brought together to pay in rent for an advanced period, thus providing funds to build, and eliminating the speculative and financing profit. The rents which the group of unconnected individuals must pay in a new building built in the usual way for profit to the owner are computed to include returns, not only on the high present cost of construction and maintenance, but on the high cost of financing and on an element of profiteering which has been definitely introduced into the speculative real estate field in the last two years.

We may take, for example, the wild speculation in apartment houses which has been carried on in New York. Here apartment houses have been purchased originally on a basis of six or seven times the annual rental. Immediately rents were raised and the building resold to another speculator or investor. In many cases buildings have been sold seven or eight times in a few months, and the tenants have been forced to pay rents which have been increased to sometimes as much as three times the rentals paid during the pre-war period. It is evident that if the first purchasers had been a group of individuals interested in living in the building, they could have realized a great saving on rental cost which has gone into profiteer financing.

As usual, a realization of this possibility has come to the public somewhat too late in New York; but it is interesting to note that hundreds of existing buildings have recently been placed on the market for sale under a co-operative plan, whereby a tenant purchases his apartment outright, and the building is operated under the usual co-operative methods as described here in later paragraphs.

Naturally, during this period of high rentals, there have been sporadic and unsound attempts at the development of co-operative projects. Many old buildings have been sold on this basis, but under plans which were not properly conceived so that the

general idea of joint ownership may often be hurt through the failure of projects not properly studied from the business, design or construction viewpoint. It is a fact, however, that practically every co-operative apartment project which has been carefully developed and promoted with the single idea of benefiting a group of tenants and not of being unduly commercial in the requirement of large profits for the promoter or the builder, is showing successful results. Several such projects will be described in a later section of this series of articles. Meanwhile, it may be noted that the interest of the public in co-operative apartment buildings is increasing greatly, and it may be confidently forecast that within the next few years a large number of such projects will be successfully developed. This type of building invariably requires architectural service, and in order that the architect may render efficient service it is necessary that he be fully informed as to the nature of such projects from the viewpoints of the promoter and investors.

Methods of Operation

There are three general methods for carrying out joint-ownership projects:

1. The formation of a stock company to provide the necessary equity. This is the plan heretofore described in which about 40 per cent of the building space was occupied by owners and 60 per cent made available for renting purposes, the rental income being used to defray expenses on the entire building.

2. Another plan which has been used successfully for the development of small buildings has been what is called straight co-operative building ownership. In this plan a stock company is formed, and the entire space is occupied by owners. For instance, if ten individuals formed a stock company, a building was built containing ten apartments, and the actual ownership of each apartment was vested in an individual who contributed to the purchase of stock. This plan had the advantage of a less involved financing operation, and the building was operated by a committee of tenants. Each apartment owner paid an annual owner's rent of an amount so figured that the total rental would equal the approximate renting cost. At the end of a year a deficiency payment was required or a rebate given, depending on whether or not the cost of maintenance overran the total of owners' rentals. This is a simple plan which has proved successful in bringing all the benefits of ownership to the individual apartment tenant.

3. A third plan which has been successfully used is a combination of the two plans just outlined. This involves the formation of a stock company and the provision of rentable space, but also charges for rent of the apartment at the prevailing market rates. At the end of each year's operation the profits of the building are divided and rebated in cash to the stockholders, thus accomplishing in effect the same condition as in the first plan discussed, a plan which is often adopted.

In discussing various methods in articles on this subject in The Forum in 1920 it was difficult to determine which would be the most successful. Recent experience, however, indicates that the profitable plan is that outlined under No. 2. This is known as the straight co-operative ownership plan in which the entire building is occupied by tenant-owners without any rentable space. It has been found that this plan is recommended by its simplicity of operation and by the fact that it requires a smaller investment than for a building where a certain proportion of space is to be rented at market rates.

Development of Project

The first step in the development of a co-operative project is its incorporation. Title to the land and building should be conveyed to and held by a corporation made up of the tenant-owners, the charter of which should limit the corporation to the ownership and operation of the building, in order to provide against possible speculation in other enterprises by action of a majority of directors and to insure the proper distribution of the proceeds of the sale of the building should a sale be effected.

The points just outlined should be given careful consideration by the purchaser of a co-operative apartment. He should know definitely what he is buying, and in a restricted corporation as outlined here he does know. Inversely, from the viewpoint of those interested in developing co-operative apartment housing schemes, it is well to realize that this form of incorporation safeguards the investment of the individual stockholder, and is the best and easiest form for successful promotion.

It may be noted also that the development of the co-operative project is not today so personal a matter as in the past, but is usually carried out by interested individuals who will profit by some phase of the transaction which comes within the scope of their business activity. An architect, a builder or a landlord may be the active means of developing a co-operative project to a point where benefit may be received by all persons interested.

Assuming that a stock company is formed for the purpose of providing the necessary equity, we find a possibility of admitting to the advantages of co-partnership those who may not have sufficient funds to buy stock outright. A plan has recently been worked out by several building corporations through which the purchasers of stock are required to make a first payment, and allowed several years in which to pay for stock on the installment plan, at the same time occupying their apartments. The actual equity financing in such cases is done by the building corporation or by others primarily interested, and their money is returned to them by the installment payments of the actual purchasers of stock who are living in the building.

Details of this plan will be given in the next article of this series, to be published in the September issue.

In developing a corporation of this type it is usual to include the ownership of but one building in one corporation. The new company is capitalized for the amount of the equity, the entire stock being held by the stockholders in proportion to the size of the apartments occupied by them, and all apartments in the building are leased to stockholders for their own personal occupancy.

Provision must be made to enable the stockholder to vacate the apartment occupied under the terms of his ownership lease. It is found that the best method for doing this is to allow him to vacate at the end of any yearly period after having given three months' notice to his associate owners. After vacating the building the shareholder may either retain his share in the building, on which he will receive a dividend, or he may sell it. The assignment of the share in the building, however, should not carry with it the right to the new buyer of leasing and occupying the apartment in question until the prospective tenant has been passed upon by the whole corporation or its agent.

Frederic Culver, president of the Joint Ownership Companies of New York (a member of the Consultation Committee of THE ARCHITECTURAL FORUM) who has successfully promoted a number of buildings of this type, makes these interesting comments:

"It is safe to assume that no residence designed for individual occupancy can be produced or operated as economically as a building of the same character designed for group occupancy. When you add to this the many burdens thrown on an individual in the administration of his individual unit, you touch one of the potential causes leading to group living in city and suburban districts. Add to this the economies practiced by commercial landlords, want of proper scrutiny of tenants allowed to rent in large buildings, unexpected, inconvenient and inordinate increases of rent and many similar annoyances and you have other causes which impel wise people to turn to group building.

"A purchaser of stock in a co-operative building, reflecting the savings derived by quantity production and carrying only a reasonable profit to the promoter-constructor, acquires a habitation suited to his requirements cheaper than it could be produced in any other way. When the operation is concluded the stock should be worth more than it cost. The owner of the stock also enjoys the advantages of co-operative administration, has a voice in the management of the property, can treat his apartment in any way desired, is forever free from increases of rent, and in a comparatively short time amortizes his principal investment through the savings made.

"A co-operative apartment building should discard everything which costs money without adding commercial value. All lines and proportions should be used for architectural effect to the exclusion of expensive materials, and the apartments should be completed in the simplest manner possible, leaving the occupant to make his own expenditures on the interior treatment. These features, coupled with a fixed rent for 95 years, make for the economy and pleasure of this type of ownership and occupancy.

"The floor plan having been adopted, disinterested real estate experts, with knowledge of local renting values of the district, should be asked to appraise the renting values of the various apartments, and on these disinterested opinions of revenue values and expert advice as to operating expenses the whole financial structure should be based. The profits to be made by the promoter-contractor for all services in the conception, planning, financing and erection of the building should in no instance exceed 15 per cent of the total cost, and this should be the only profit in the enterprise; otherwise, in most cases, it will penalize the investor.

"After satisfactory title insurance is obtained and a demand for the stock is manifested the enterprise should proceed. The voluntary purchase of the stock of such an enterprise is the justification for its creation. Such an enterprise can safely assure to the owner a return of from 10 to 15 per cent annually on the investment, either in occupation or through sub-letting. Those who promise rent free or benefits more exaggerated than this are treading on dangerous ground."

Management of Building

After completing the incorporation and the sale of stock the usual procedure is to appoint a management committee selected from among the tenant-owners and usually in proportion of three out of each ten. This committee will control the general management of the building and general business policies, acting in a manner similar to the board of directors of a business corporation. Experience has shown, however, that the details of actual building management should be delegated to a reputable and competent individual or real estate firm, experienced in the management of properties of this class. Accounting on rental income and maintenance expenditures will be made by this manager to the committee of tenant-owners usually in the form of a monthly report. This committee in turn reports to a stockholders' meeting at regular periods of six months or annually. The fact should be emphasized that the share of the ownership in the building should be separated from the tenancy; a schedule of rents adopted for each apartment which, in total, would provide an income sufficient to pay the expenses of operation and fixed charges, including taxes, etc., a fixed amount to be set aside for the amortization of the mortgage and a balance sufficient to pay a reasonable return on the investment in the form of dividends. Leases should be entered into between the tenant-owners and their corporation, providing for

annually renewable leases, containing proper restrictions and the provision that they cannot be terminated except for failure to perform or upon notice from the tenant to the landlord on the first day of July, terminating the lease on the first day of October following, in which event the apartment can be re-let for the benefit of the tenant-ownership corporation. Or a plan should be adopted which should include in the rentals paid by the tenant-owners an income sufficient to meet all fixed charges and amortization, and in addition a sum to meet contingencies.

The importance of the location of joint-ownership buildings cannot be too greatly stressed. As co-operative housing is for residential uses the utmost care should be observed to build only in firmly established residential neighborhoods. Not only is the careful selection of location for a building of this type important, but care must be taken to anticipate the class of residential occupancy.

It is well known that in the average city certain neighborhoods are definitely classified by the type of people who may be developing homes in the vicinity. Consequently, in locating a building of this nature the advice of real estate experts should be sought in order to analyze the trend of development, not only to avoid commercial or industrial development in a city or town not protected by a zoning plan, but to determine as closely as possible the character of residential occupancy which may be expected for years to come. This is often indicated by the price of land, which though high may be desirable because of its value as a determining factor in the class of construction and occupancy which may be expected.

Frank Mann, Tenement House Commissioner of New York, has reported favorably on the idea of the joint-ownership residential building provided the various precautions indicated in this article are taken. In regard to the purchase of the land he says, "In buying land for buildings of this nature it has proven better to buy land in already well established residential neighborhoods, even though the original cost is much higher than in partially developed sections. The neighborhood which already bears the stamp of high class residential development, particularly if the land is protected against commercial and industrial encroachment through the medium of long term restrictions, offers the best location for a building of this nature.

"In general, the building should be located within easy transportation distance of business and amusement centers, and in planning the building a definite class of occupancy should be determined upon and catered to, both in plan and location.

"Care should be taken as to the examination of title by the employment of a title company or a reputable lawyer to see that the title offered is marketable, or that it is free and clear from all incumbrances, except such as shall be definitely agreed upon.

"If the property is purchased subject to a mortgage, the mortgage should be either for a long term with an amortization plan or a savings bank mortgage, which is reasonably certain of permanency, and in no case should the mortgage be for more than 60 per cent of the market value of the property. The plan should include the setting aside of a certain amount annually for the retirement of the mortgage."

As indicated in this paragraph, the co-operative ownership method offers particularly good inducements to institutions or individuals having money for loan on real estate. As nearly as can be determined, there is no record of a co-operative apartment house having undergone a foreclosure of mortgage.

In the usual co-operative plan, as Mr. Mann says, a sinking fund is established which will gradually retire the mortgage. Each owner in paying an established owner's rental pays an amount toward this sinking fund. Naturally, as the mortgage is reduced the equity is increased, so that this sinking fund is in effect an owner's savings account.

Old Fine Arts Building in Which A. I. A. Convention Banquet was Held

✓ Concrete Construction

II. MIXING AND PLACING OF CONCRETE

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

CONCRETE is manufactured to order on each job, according to the architect's specifications and under his supervision. Not only is this so, but it is made largely from local materials which cannot be standardized. Cement,—always Portland cement on modern construction,—aggregates and water are the raw materials of concrete. To these are sometimes added small percentages of foreign matter for coloring or waterproofing. Portland cement is made from limestone and clay, approximately three parts limestone being used to one part clay. These are ground together, fused to a clinker, and then ground again to a fine powder. Gypsum is added to the finished product in order to regulate the time of setting. Portland cement differs from natural cement in being absolutely uniform in quality and in being carefully proportioned to give maximum strength.

The principal standard specification requirements for Portland cement are strength, soundness and time of set. Fineness has a very great influence on the properties of cement. The finer the cement, the more readily and completely does it react with the water. Furthermore, since one of the functions of the cement is to coat all particles of aggregate, it is obvious that with a given amount of cement the finer it is, the greater will be its covering power. The standard specification is that not more than 22 per cent of the cement shall be retained on a sieve having 200 meshes per linear inch.

The standard strength test for cement is a tensile test. This is because the tensile test is simpler to make and has been considered a fair comparative indication of the compressive strength. When mixed with standard Ottawa sand in the proportions of 1:3, a satisfactory cement should have a strength of at least 200 pounds per square inch at an age of 7 days, and a strength of 300 pounds at 28 days. Also, it must be stronger at 28 days than at 7 days. This test will probably be superseded by a compressive test before many years. Soundness tests are made to detect an excess of impurities, commonly found in cement rock, such as free lime, magnesia or sulphates which will cause the cement to swell, disintegrate or crumble during setting. For this test a cement pat about the size and shape of a thin-edged cookie is made on glass, and exposed over boiling water for five hours as an accelerated test. A satisfactory cement should remain firm and hard. If the results of other tests seem to indicate adulteration, chemical tests are made and standard specifications give limits for impurities.

Time of setting is not a criterion of quality, but it is a very important factor in the use of cement. A cement which sets too quickly interferes with placing concrete, while one which sets too slowly delays the work. The process of setting or strengthening is a continuous one which goes on for many months, probably for many years. Two stages in the process have been taken for testing, and are called initial and final set. They are determined by the time at which the cement will bear the pressure of needles of fixed weight and size with a certain penetration. Initial set is approximately the stage after which cement will not thoroughly unite along the surface of a break. With the standard Vicat needle the minimum specified time for initial set is 45 minutes. As a factor of safety, 30 minutes is used in the better concrete specifications as a limiting time within which bonding of consecutive pourings shall be done. Final set is the stage when the concrete has appreciable strength—when it is safe to walk around on it. For a satisfactory cement the time of final set must not be greater than 10 hours.

Cement as manufactured today by the well known companies is a standard product as dependable in quality as structural steel. Deterioration after leaving the mill, due to improper storage conditions, may, however, be less obvious than heavy rust on steel sections. Nevertheless, on the average job the aggregates, particularly the fine aggregates, are more open to suspicion and in need of tests than is the cement.

Aggregate is the term applied to the inert materials which compose the bulk of ordinary concrete. The obviously necessary requirements of concrete aggregates are that they shall be dense, hard and durable. The division of concrete aggregates into fine and coarse, or in more usual terms sand and stone, is purely arbitrary. Fine aggregate or sand is usually considered as that which will pass a ¼-inch screen. Coarse aggregate is that from ¼ inch up to the specified maximum size.

Fine aggregate as used is either natural sand or crushed stone screenings. Natural sand, being the result of rock disintegration, partakes of the nature of the parent rock. Through the law of survival of the fittest, quartz is the commonest constituent of natural sand. It is a satisfactory sand. Bank sand is most used, but unless of known quality it should be tested. Beach sand is often satisfactory if not taken so near the tide line as to contain organic matter. It is sometimes too fine to be used alone in first class work. Sand must be clean. Clay is harmless in itself and may add to the density of a lean mixture. In a richer mixture (1:2:4 or better) clay either introduces weak clay pellets in the concrete or by coating the harder particles prevents

the cement from adhering. Silt or loam, containing organic matter in addition to the weaknesses of clay, causes injurious chemical reactions such that one-tenth of one per cent of tannic acid will reduce the strength of the concrete 25 per cent, and a very small amount of loam may delay the setting of the cement almost indefinitely.

Sand tests are "mechanical analyses" which show the grading; *i.e.*, the amount of each size particle, tests for organic matter or other impurities, and strength tests. The mechanical analyses are useful and necessary in economically proportioning the concrete mixture, and the impurity test gives required information concerning quality. Doubtful results in this latter test are checked by strength tests. The first test is made by putting a dried sample through successively smaller screens and weighing the percentage retained on each. For impurities several tests are made. Microscopic examinations show coatings of any nature on the particles. Organic impurities can be detected by the sodium hydroxide test.*

Crushed stone screenings make an excellent fine aggregate if the dust is screened or washed out. The physical properties are easily judged from the parent rock, and freedom from dust is the only needed test. Strength tests are the final criteria for sand, and they are made in compression on 2-inch cubes. Comparison is made with "Standard Ottawa Sand."

Igneous rocks are looked on with most favor in the east for coarse aggregates. The fine-grained rocks like trap are perhaps the best. The granites are good excepting that under great heat they disintegrate, owing to unequal expansion of the grains. This applies to all the coarser crystalline rocks. Of the sedimentary stones sandstone is sometimes satisfactory, if the cementing material or matrix is not subject to disintegration. Limestone is usually a good aggregate, although not ordinarily as strong as the igneous rock. Recent tests seem to indicate that hardness and strength are not so essential in sound coarse aggregate as shape, size and porosity, since any sound stone is strong enough for stresses to which concrete is subjected.

* See "Tentative Method of Test for Organic Impurities in Sand for Concrete," Am. Soc. for Test. Mat., C40-21T.

Gravel, which is stone broken up and rounded by natural processes, is widely used for coarse aggregate. Unless disintegrated, due to being in small pieces, its properties are identical with the rock of which it once formed a part. Cinders and blast furnace slag are sometimes used as aggregate. Cinders have little strength and often a dangerous amount of sulphur. Lightness and cheapness are their only recommendations. They are seldom used except for filling. Slag is much stronger than cinders, and it may make a satisfactory aggregate provided its sulphur content is sufficiently low. Tests of coarse aggregate concern mainly mechanical analysis and cleanness. Gravel in particular is likely to have a film of injurious material, hardly visible to the naked eye.

Water is necessary for the setting action of cement, and it also acts as a flux for spreading the cement over the surface of the aggregate and to some extent as a lubricant for the mass. Most water from sources of public supply is satisfactory. Sea water is not. Oil, acid, alkali salts or vegetable matter are detrimental and often dangerous. Oil can be detected by the characteristic iridescent film. Acids or alkali can be tested with litmus paper and salts by evaporation. Vegetable or organic matter frequently shows in the form of floating particles or turbidity, but not always. Whenever there is any doubt concerning the purity of water, tests of its effect on setting and strength should be made.

Satisfactory materials being obtained, the crux of the concrete manufacture is in the proportioning of the constituent parts. In the early days of concrete, bank-run gravel was frequently used, but as soon as theories of density were evolved it was realized that a natural mixture of sand and gravel was almost never a dense mixture. Tests showed that strength varied directly with density of the concrete in place. Voids in aggregate were studied and it was found that sand and gravel with grains of nearly uniform size and shape had about 45 per cent voids. With a small excess allowance this becomes the one-half which is still the conventional ratio of fine to coarse aggregate. Taking the cement as one-half the sand gives the 1:2:4 mixture which achieved early popularity, and is now by far the

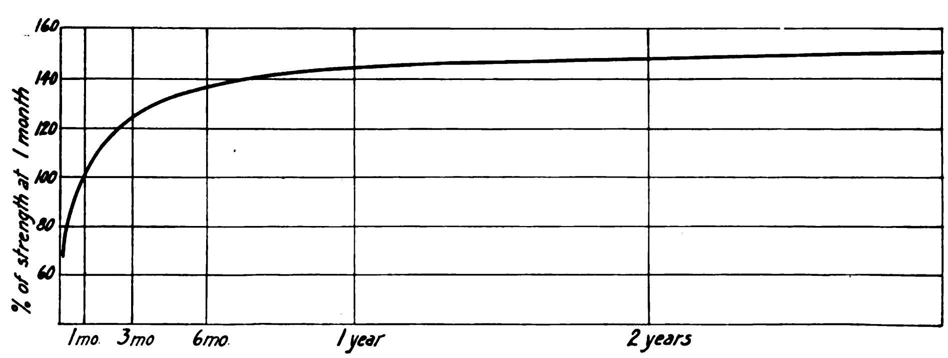


Fig. 1

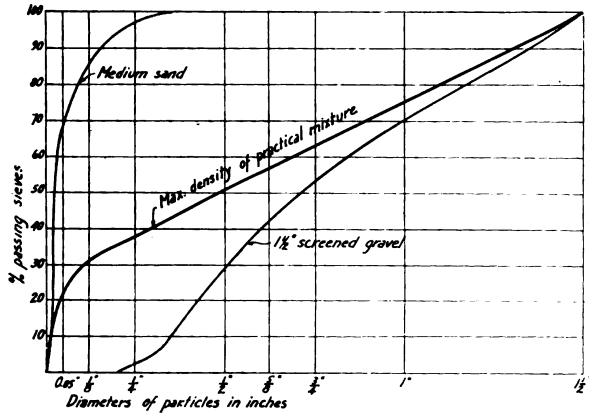


Fig. 2

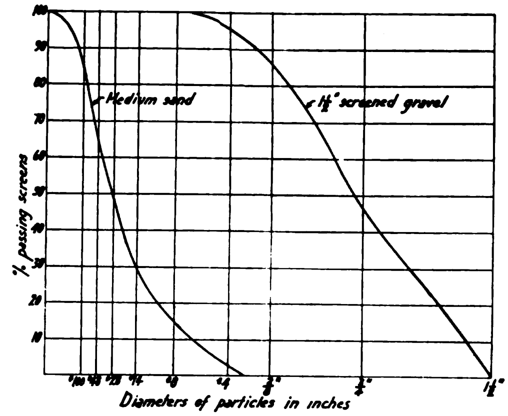


Fig. 3

most used proportion in concrete of the usual kinds.

With the knowledge that a graded sand or stone had fewer voids than one with uniform sized grains,—since the smaller grains can fit in between the larger without increasing the volume of the mass,—came also the realization that by a study of specific aggregates a much denser mixture could be made than by conventional proportions. From mechanical analysis, grading curves of aggregates were plotted. By experiment a combination grading curve for the entire mixture corresponding to maximum density was evolved by William B. Fuller. Recent studies by Chapman, Johnson and others have brought out the theory of surface areas of aggregates as a factor in concrete mixture, since the cement should cover all these surfaces. As a sphere has the least ratio of surface to volume of any solid, rounded grains are obviously better in this respect than angular grains. This is an advantage of gravel over broken stone, and also of rounded sand grains over those conforming to the obsolete sharpness requirement. (Fig. 2.)

Most recent tests by Prof. Duff Abrams of Lewis Institute, in co-operation with the Portland Cement Association, indicate that the strength of a concrete is in proportion to a function of the aggregate called the "fineness modulus." This fineness modulus is the sum of the percentages of an aggregate retained on successive screens of a standard set. The standard set of screens is: 100, 48, 28, 14, 8 and 4 meshes per inch and ⅜", ¾", 1½", etc. It is so arranged that each screen has twice the clear opening of the next smaller. Considering Fig. 3, the fineness modulus of sand or gravel is derived thus:

	Per cent retained on each sieve	
	Sand	Gravel
100-mesh	85	1.00
48 "	65	1.00
28 "	50	1.00
14 "	35	1.00
8 "	15	1.00
4 "	0	.95
⅜" "	0	.85
¾" "	0	.45
1½" "	0	.00
Fineness modulus	2.50	7.25

From the foregoing it may be noted that 1.50 fineness modulus would be a very fine sand, while a stone with a maximum size of 1½ inches would have a maximum fineness modulus of 8.00. From the fineness modulus of various aggregates, that of any combination is easily arrived at. Prof. Abrams' tests show that the strength of concrete increases with fineness modulus of the combined aggregate up to published values varying from approximately 5.00 for a lean concrete mix to 6.75 for a rich mix. Above this strength falls off slightly with increase in fineness modulus. Prof. Abrams reports that the strength of concrete varies directly with the ratio of water to cement—considering only workable mixtures, the more water the weaker the concrete—and that there is a direct relation between the fineness modulus and the amount of water required for a workable concrete. Tests show that too much and too little water are both bad. In building construction, however, it is practically impossible to use a mixture which is too dry for maximum strength. The variation of strength with proportions of water is shown in Fig. 4.

A deficiency in water prevents complete reaction of the cement. An excess of water dilutes the cement so much as to prevent in part its crystallization. Spading brings much of the excess water to the surface, where it runs off, but part of it remains pocketed in the concrete to leave voids after it finally evaporates. Through spading and evaporation the excess water is eventually reduced to the point where the setting process is completed, but the excess water which runs off carries with it much of the finest and most valuable part of the cement, and the excess which remains delays setting and after evaporation leaves weakening voids.

The consistency which gives maximum strength when packed into a test mould does not necessarily give maximum strength under field conditions. A wetter mixture may, and usually does, give greater density and strength due to the readiness with which it flows around the reinforcing and fills the forms. Hence the usually specified quaking mix, which will flow sluggishly around the rein-

forcing, is the best for ordinary work. A field test for consistency—the first standard test of its kind—has recently been adopted by the American Society for Testing Materials (Serial Designation D62–20T).

A frustum of a standard cone is filled with concrete, inverted on the floor, and the settlement or slump is measured. For ordinary building work the slump should be 2–2½ inches. When more sloppy

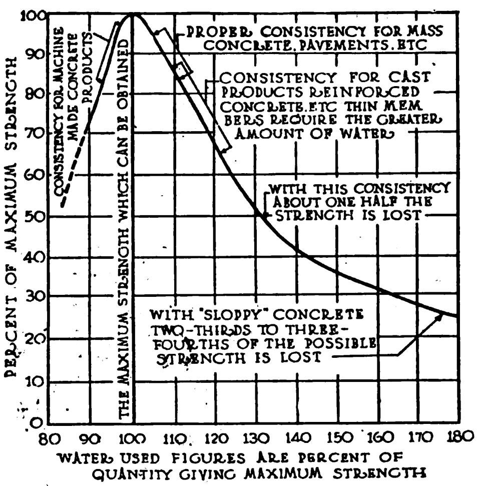


Fig. 4

mixtures are required for special cases, the cement as well as the water must be increased. Using this as a standard and based on Prof. Abrams' tests, the recently issued Tentative Specifications for Concrete and Reinforced Concrete of the Joint Committee of the national engineering societies give tables of proportions of cement and aggregates to give concrete of 1500, 2000, 2500 and 3000 pounds per square inch at 28 days. These tables cover all practical consistencies and all ordinary sizes of aggregates.

From all this discussion two points stand out clearly: First, arbitrary proportions are unscientific and wasteful. As fast as custom and building laws permit, proportioning must be by some such tables as mentioned in the previous paragraph—the properties and method of testing of aggregates rather than the proportions being the points specified; Secondly, the amount of water is of the greatest importance. Excess water may, and often does, reduce the strength as much as 50 per cent.

As was previously said, the setting or increase in strength of cement, and consequently of concrete, continues at a gradually decreasing rate for a year or more. This is indicated in Fig. 1 for average conditions. The strength at 28 days is the figure which is taken as a measure. Under the older Joint Committee Specifications this was assumed at from 2000 pounds per square inch for 1 : 2 : 4 concrete to 3000 pounds for 1 : 1 : 2 concrete. The former figure was rather a laboratory than a field figure, and in the recently published specification a similar mixture is rated at 1500 pounds. The working stresses for this concrete are not reduced by the same amount, however. These strength assumptions are made on the basis of a 70° Fahr. temperature during the setting process. The rate of setting is materially slower at lower temperatures, as shown in Fig. 5. Owing to the heat generated by chemical reactions, however, the average temperature of the body of the concrete is somewhat higher than the surrounding air. This is particularly the case with large members or masses of concrete.

Foreign ingredients are sometimes introduced into the concrete mixture. Various compounds are used as integral waterproofing, but their use is diminishing. Mineral colorings are used in face mixtures, as considered in a previous article. Chemicals are used to lower the freezing point, and where there is no objection to some loss of strength, some of the compounds sold for this purpose are valuable.

The aggregates for concrete are, in practice, decided by a balancing of desirable requirements with cost of available materials. It is sometimes cheaper to use the excess of cement needed with an easily available aggregate of medium quality than to import a better aggregate. The selected materials are mixed in a suitable batch-mixer for at least a minute, placed in the forms as quickly as possible, in such a manner as not to separate the ingredients, and the concrete thoroughly compacted in the forms.

Should anyone judge from the foregoing that concrete work is too complicated to be attempted by the architect so long as other building materials are available, he has but to look about him to realize the fallacy of such an assumption. On the other hand, should the architect gain the impression that in the absence of time to study the subject thoroughly himself he should choose with great care experienced contractors to build his work and skilled engineers to advise him on its design,—he has then reached a commendable conclusion.

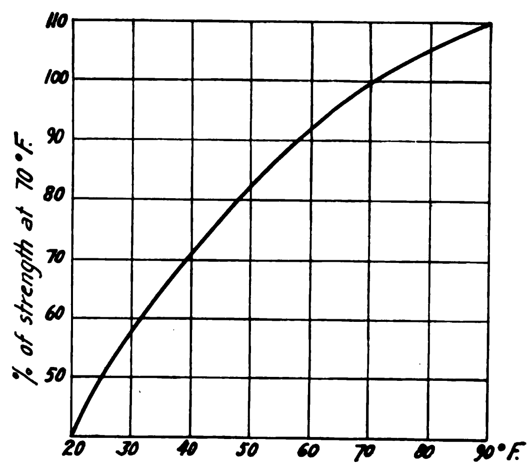


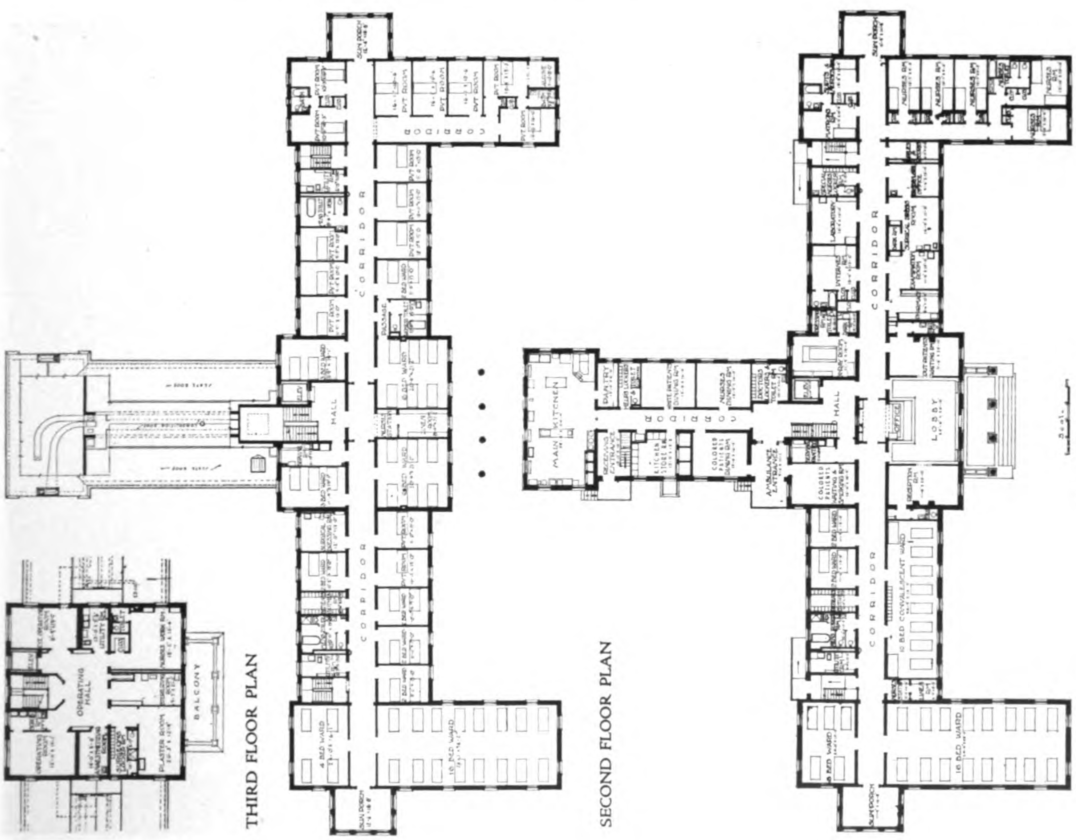
Fig. 5

GENERAL VIEW

HOSPITAL FOR THE ILLINOIS CENTRAL RAILROAD COMPANY, PADUCAH, KY

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

PORTICO ON MAIN FRONT



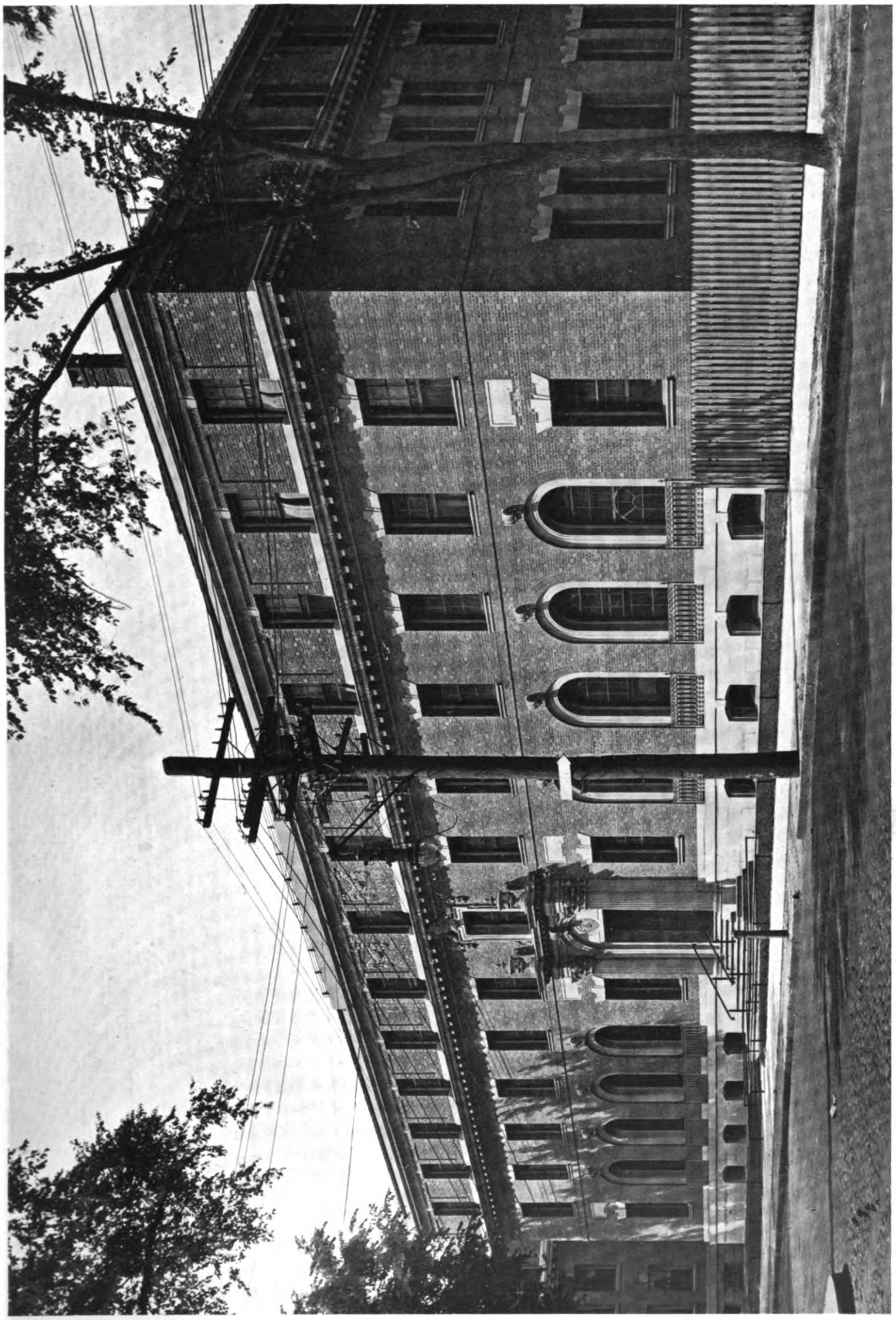
THIRD FLOOR PLAN

SECOND FLOOR PLAN

FIRST FLOOR PLAN

HOSPITAL FOR THE ILLINOIS CENTRAL RAILROAD COMPANY, PADUCAH, KY.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

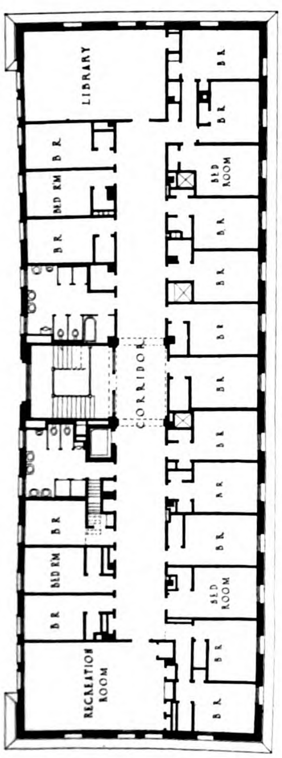


GENERAL VIEW

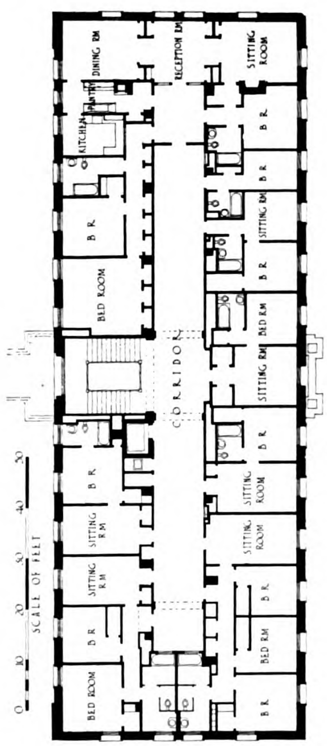
ADMINISTRATION BUILDING, NEW HAVEN HOSPITAL, NEW HAVEN, CONN.

L. W. ROBINSON, ARCHITECT; DAY & KLAUDER, ASSOCIATE ARCHITECTS

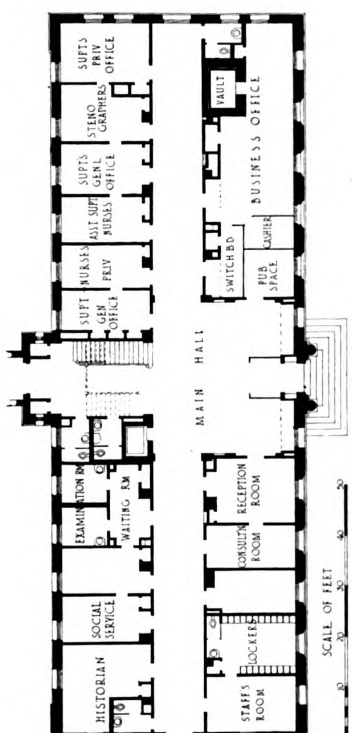
MAIN ENTRANCE



THIRD FLOOR PLAN



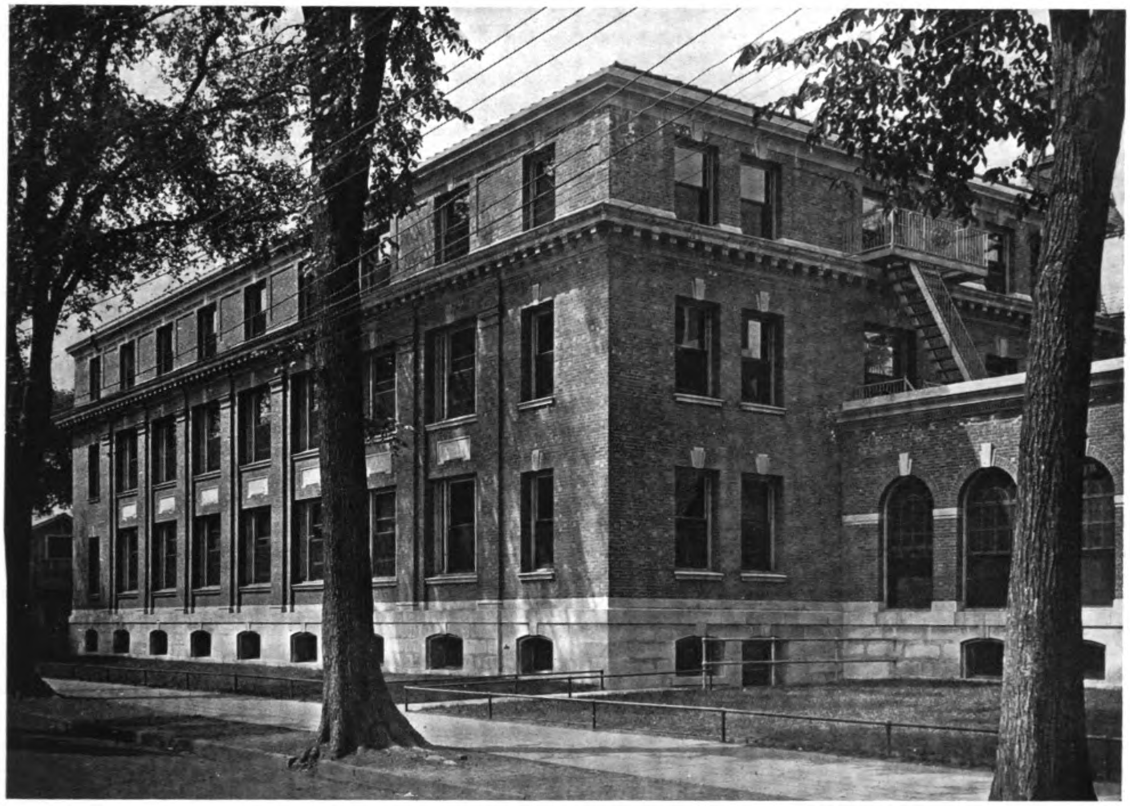
SECOND FLOOR PLAN

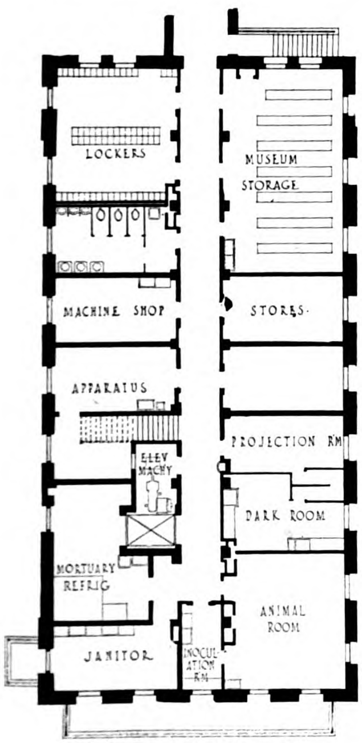


FIRST FLOOR PLAN

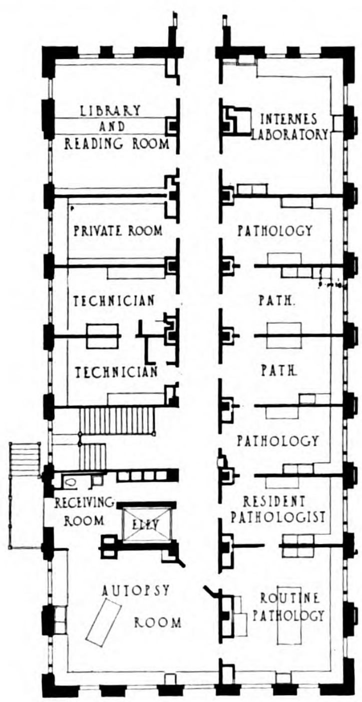
ADMINISTRATION BUILDING, NEW HAVEN HOSPITAL, NEW HAVEN, CONN.

L. W ROBINSON, ARCHITECT; DAY & KLAUDER, ASSOCIATE ARCHITECTS

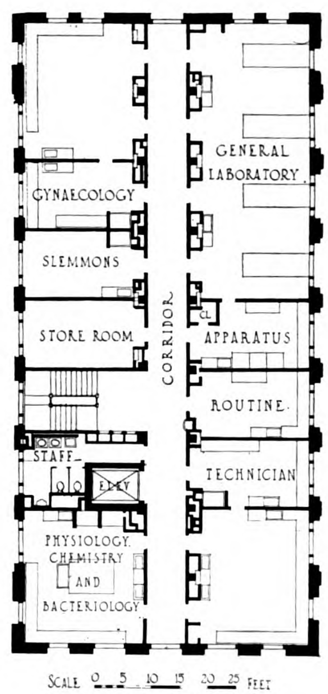




BASEMENT FLOOR PLAN



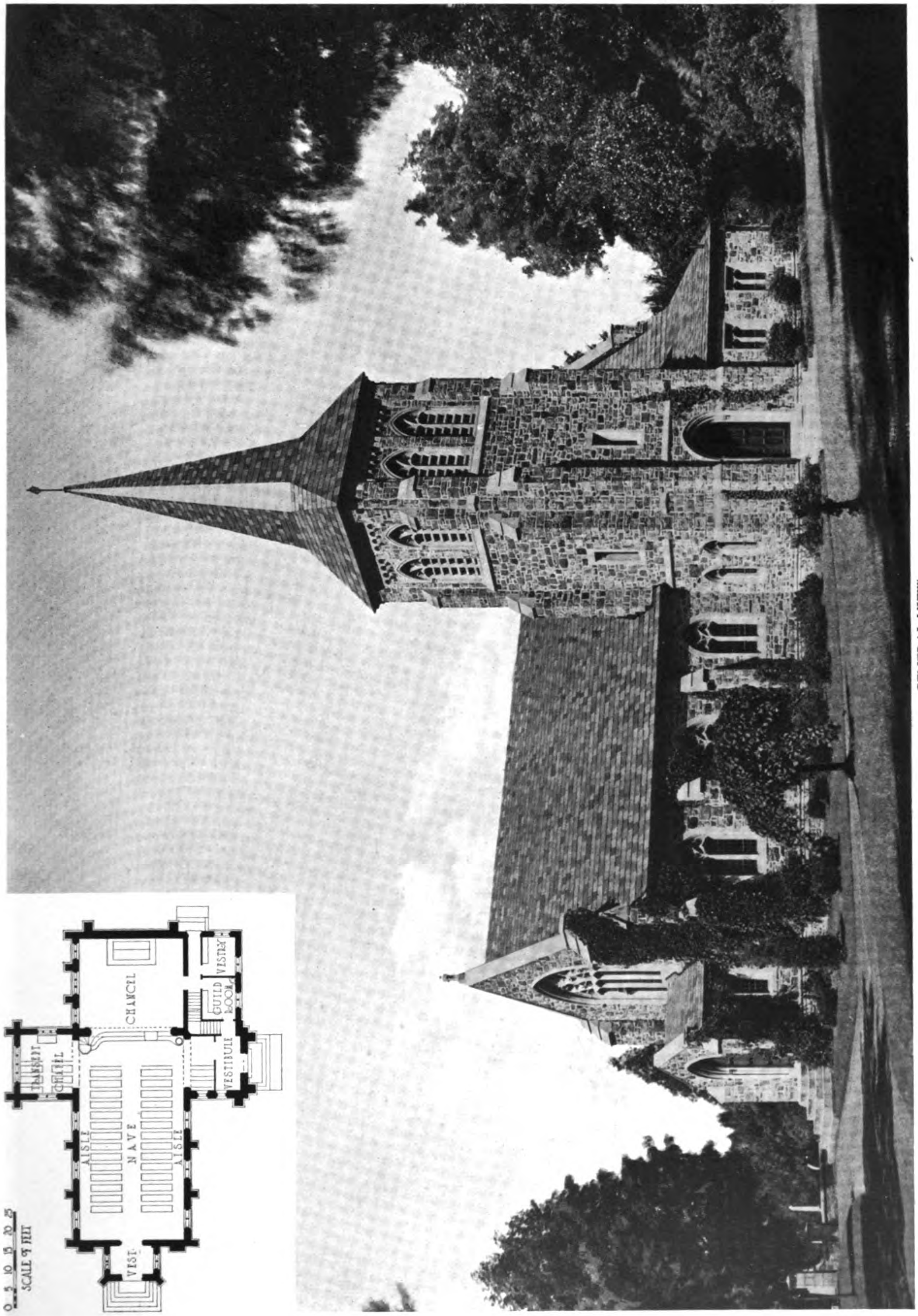
FIRST FLOOR PLAN



SECOND FLOOR PLAN

ANTHONY N. BRADY MEMORIAL LABORATORY, NEW HAVEN HOSPITAL, NEW HAVEN, CONN.

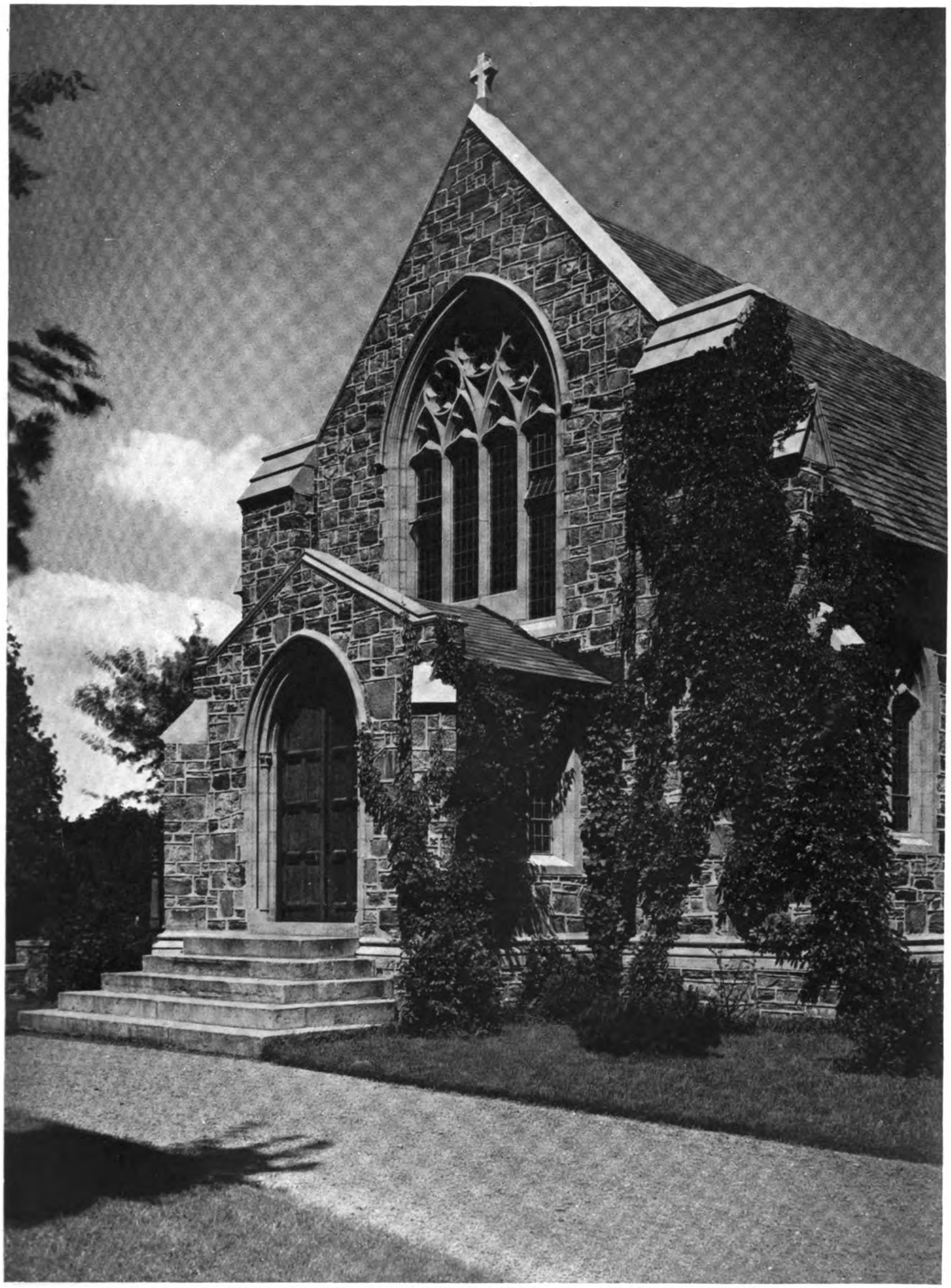
L. W. ROBINSON, ARCHITECT; DAY & KLAUDER, ASSOCIATE ARCHITECTS



GENERAL VIEW

ST. JOHN'S EPISCOPAL CHURCH, WASHINGTON, CONN.

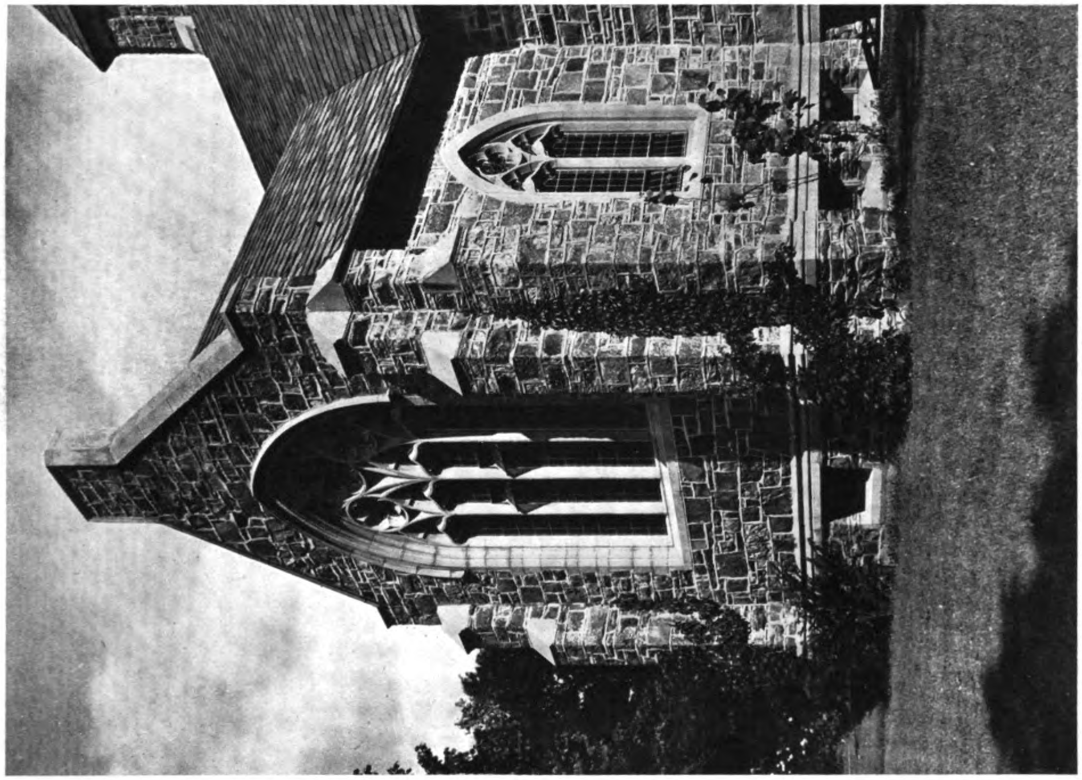
ROSSITER & MULLER, ARCHITECTS



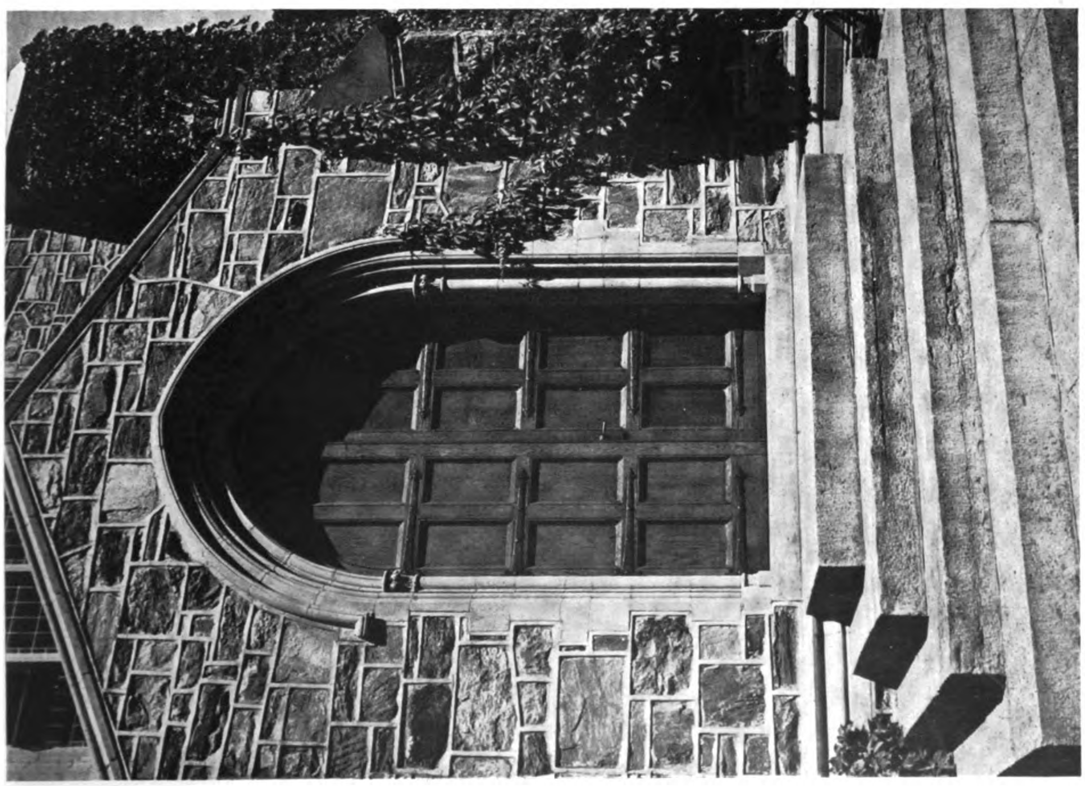
MAIN ENTRANCE TO NAVE

ST JOHN'S EPISCOPAL CHURCH, WASHINGTON, CONN.

ROSSITER & MULLER, ARCHITECTS



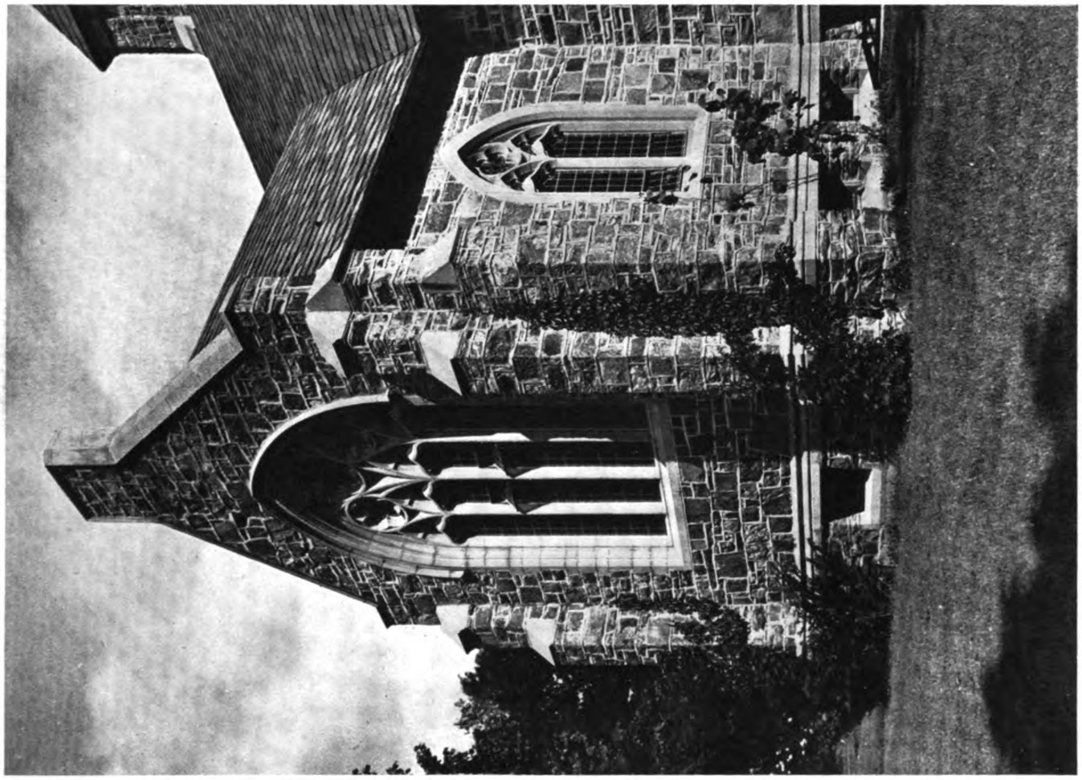
DETAIL OF TRANSEPT



MAIN DOOR DETAIL

ST. JOHN'S EPISCOPAL CHURCH, WASHINGTON, CONN

ROSSITER & MÜLLER, ARCHITECTS



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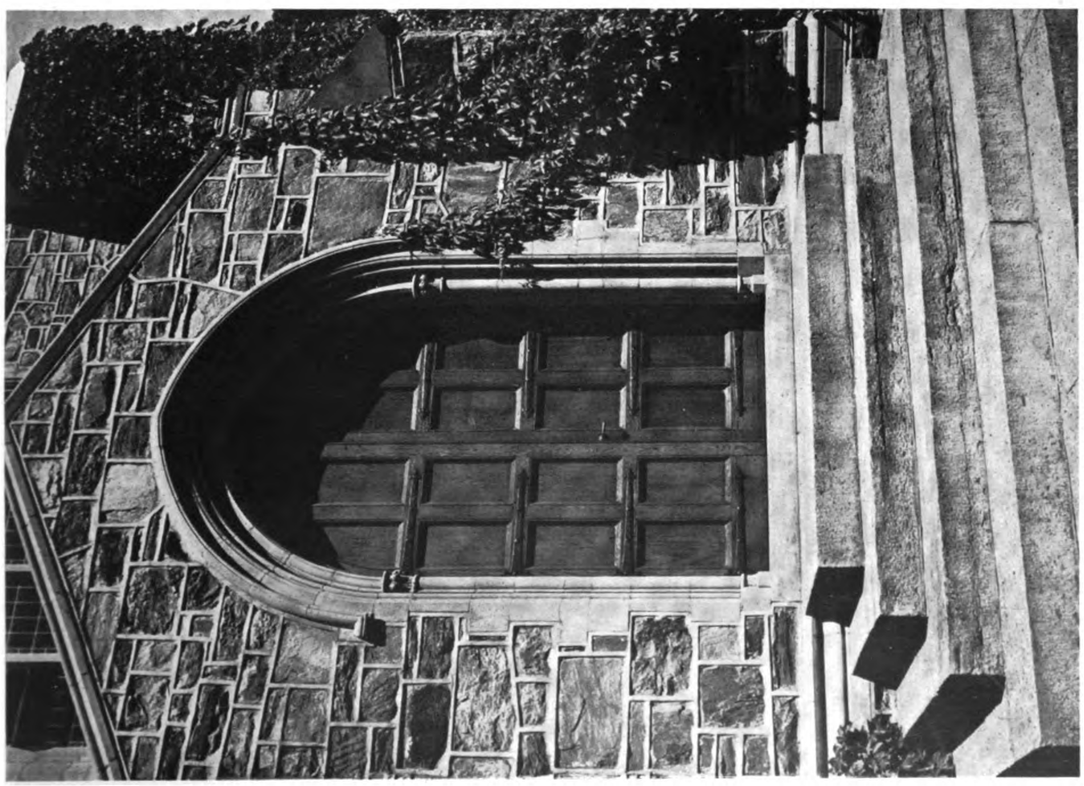


MAIN DOOR DETAIL

ST. JOHN'S EPISCOPAL CHURCH, WASHINGTON, CONN

ROSSITER & MÜLLER, ARCHITECTS

DETAIL FROM DRIVE

ENTRANCE FRONT

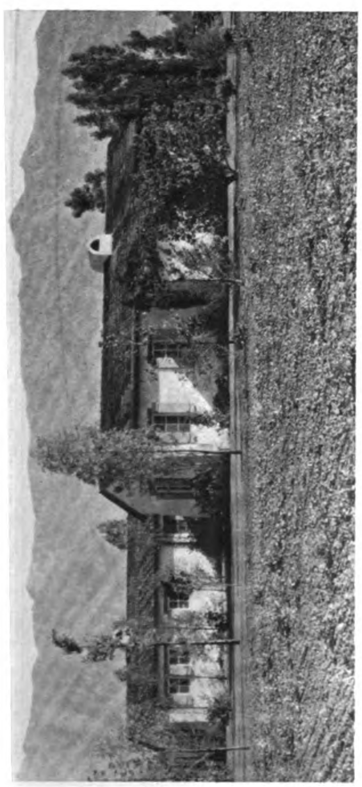
HOUSE OF ARTHUR K. BOURNE, ESQ., PASADENA, CALIF

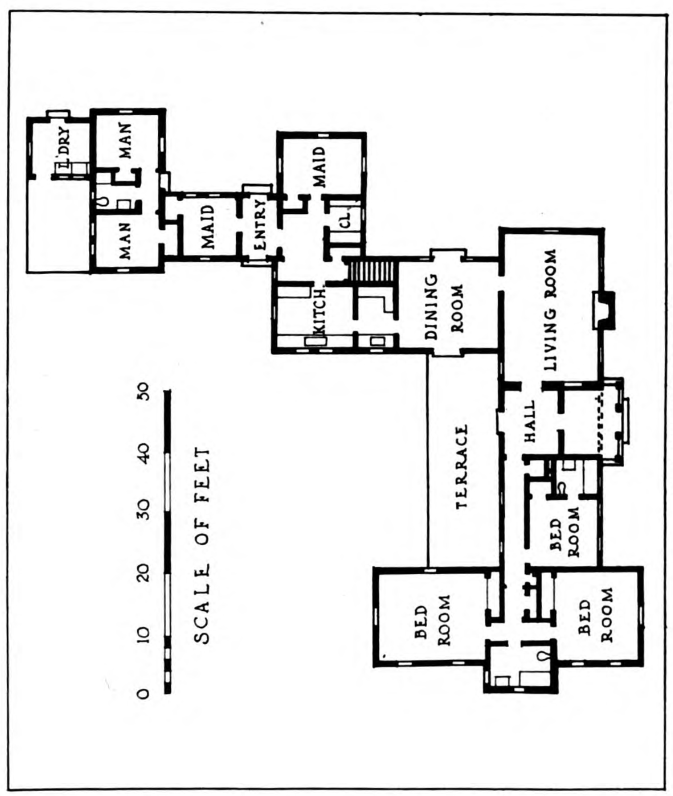
JOHNSON, KAUFMANN & COATE, ARCHITECTS

TERRACE DOORWAY

HOUSE OF ARTHUR K. BOURNE, ESQ., PASADENA, CALIF

JOHNSON, KAUFMANN & COATE, ARCHITECTS





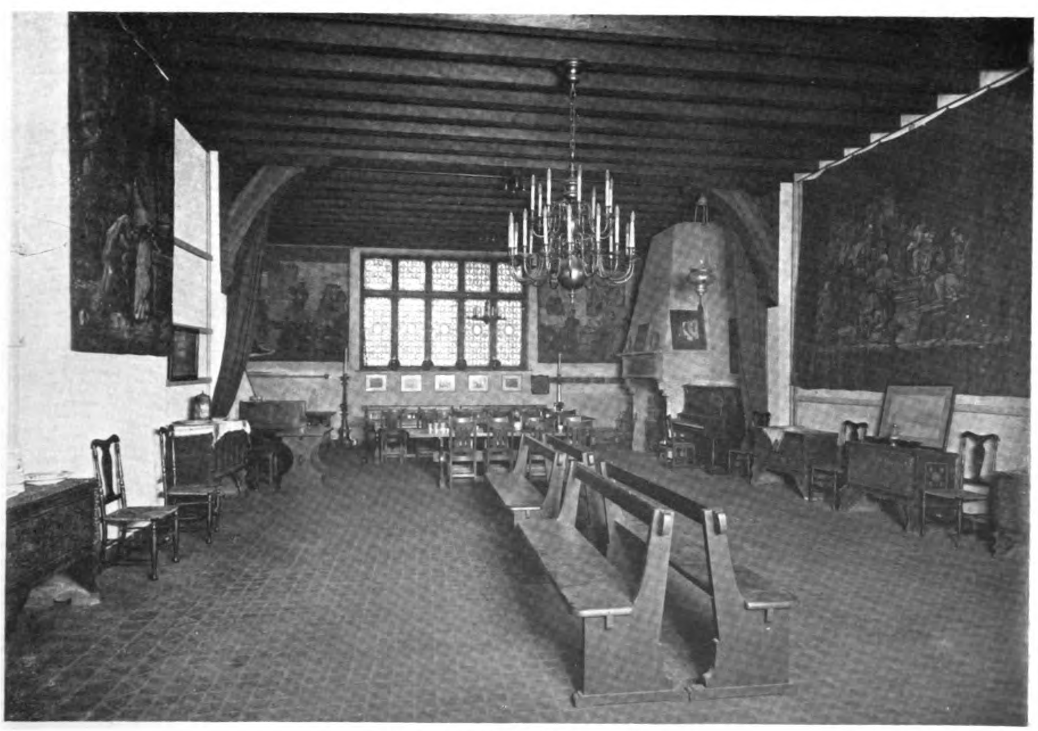
GROUND FLOOR PLAN

The Boston Architectural Club

MORE than a little suggesting the guilds of the mediæval ages is the organization which has its home at 16 Somerset street, Boston, over the entrance to which are the words "Boston Architectural Club." Formed to draw together all the men, whether draftsmen or master architects, who work together in this most noble of the arts, it gathers into its fellowship for mutual encouragement and help the eminent among Boston architects, who have already "arrived," and the junior draftsmen who are "on the way," all of which is to say that the Club exists for the purpose of associating those interested in the profession of architecture with a view to mutual encouragement and help in study.

The Club came into existence in 1889. Its early years were full of vicissitudes, alternating ups and downs, and migrations from place to place. The greatest red letter day in the history of the Club was the time in 1910 when possession was taken of several old structures on Somerset street, near the summit of Beacon Hill. Here was presented an interesting opportunity for redeeming and adapting worn and spiritless buildings to the interesting uses of a club with a distinctly architectural aim. It has been a hard struggle, and it is not ended yet, but today, after many years of effort, the results are reassuring and its value is now widely recognized.

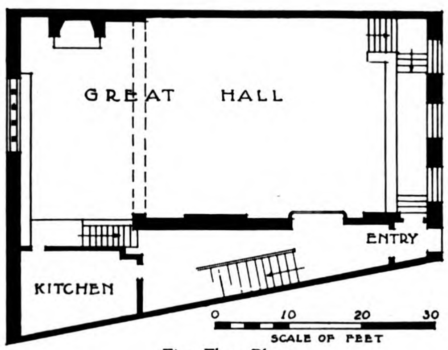
Upon this byway in the very heart of the older section of Boston, a small doorway with a dark, quaint door opens directly from the sidewalk into a dingy vestibule. A few steps lead down to a gallery which runs along the end of a large, dimly lighted banquet hall. From the end of the gallery more steps lead down to the tiled pavement of the hall. At the farther end of the hall is a group of leaded windows divided by stone mullions. At one side is a huge hooded fireplace and on the other a narrow stair ascending to a casemented kitchen. Everything in sight is only half in sight, because of the dimness and the faint haze resulting from many pipes and an occasional puff from the great logs glowing on the andirons. The deep shadows, the haze and the dark purple curtains encourage relations among those members who have just finished luncheon. Some draw up chairs around the embers of the fire, lighting their pipes or cigarettes with a live coal held in the fire tongs—part of the club ritual. Some are leaning over the heavy black oak table engaged in the earnest discussion of an "ethic." Three or four scrutinize the "exhibition"—a row of etchings, sketches or paintings hung on the north wall. One is feeling out a new air on the piano. The chef stacks the plates and disappears with them



Great Hall of the Boston Architectural Club

The Cheering Fireplace in the Great Hall

up the narrow stairs. Soon pewter plates are expected to arrive from England. Under the balcony architects are engaged in a spirited fencing match, reminiscent of their days in Paris. The balcony underneath which they fence commemorates the visit of Leonard Stokes, president of the Royal Institute of British Architects, to the Club some years ago.



First Floor Plan

At night the sconces are lighted, and the tallow drips down from the wooden rings upon which the candles are fixed. There is revelry on winter nights. The fire is almost boisterous too, and bowls of incense swing from the shadow of the heavily beamed ceiling. The members throng floor and galleries, clad in gaily colored dominoes. There is much mirth, strung upon some slender thread of a play or "masque," and there is always the Club song.

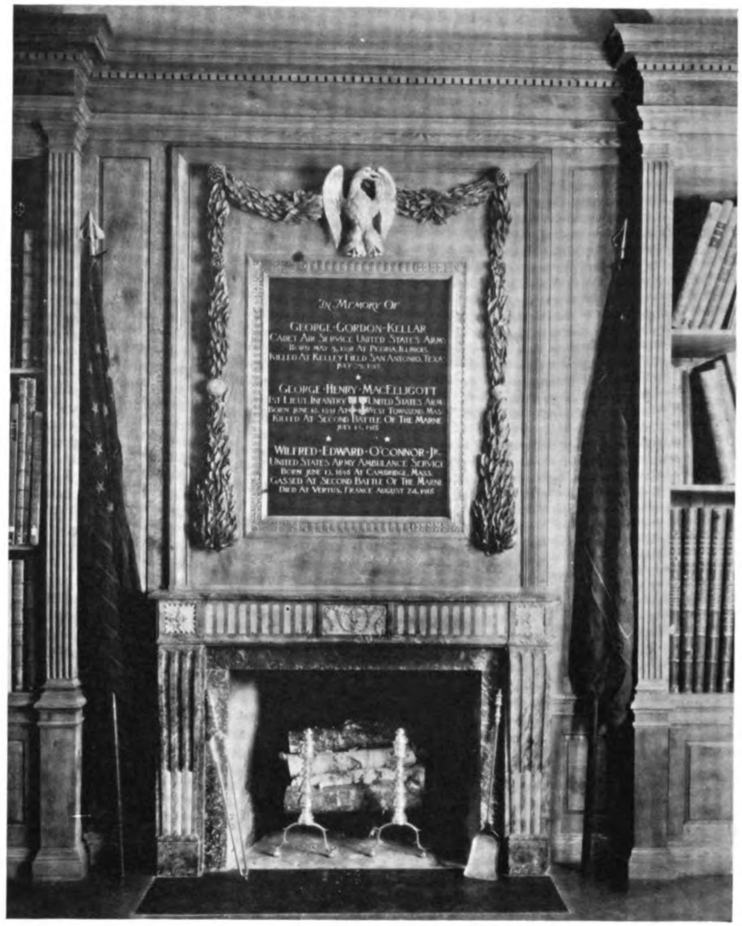
Upstairs is the reading room with tables, lamps and magazines, another piano and some "fireplace registers." The well loved volumes of Letarouillit and Pugin and the rest may be studied with as little interruption as came to the Benedictines. Upstairs again is the "lecture room," so called, with a portable blackboard for classes in mathematics, structures, shades and shadows, perspective and estimating. There is also a room where "Rufus" lives. He takes care of the Club after his regular work elsewhere. Once more upstairs, and we come to the heart of it all—the "Atelier"—a small regiment of old drafting tables huddled underneath quaint, blackened rafters which support myriad drop lights—low walls of brick, frescoed with a weird allegory, "The Egg of Originality is Bunk." This Atelier is a self-governing body. Boys whose days are perforce occupied with office work, put in evening after evening on the same problems as certain other institutions, and often with criticisms by the faculty member of Tech or Harvard. The results have been encouraging in the extreme. The Club has won a place. It has *esprit de corps*.

Not slow to perceive the advantages of alliance with

The Balcony with Iron and Wood Craftsmanship

other bodies of men who might be students of architecture, the directors of the Club, jointly with the educational committee, in 1914 achieved a union with Harvard University and with the Massachusetts Institute of Technology, in such manner as to secure to the Club the privilege of exhibiting with these institutions their work in design, and of assignment of joint problems. Year after year since that time the walls of the exhibition room have displayed the work of the younger men and boys of the Club—fellows obliged to work in offices all day, but eagerly availing themselves of the evening classes at the Club for their further education—side by side with drawings by the students of Harvard and Technology, and the Club work has stood the test creditably.

While the affairs of the Club were progressing, as here described, in a gratifying manner, the great war broke out, and threw everything into confusion. How did the Club respond? A few months after the entrance of our country into the war every man in the Boston Architectural Club, not incapacitated by age or disability, was enrolled in the service of his country. The Atelier closed its doors and gave its last man to the service. During the months that followed death claimed three of its members,—Gordon Kellar, George MacElligott and Wilfred O'Connor. As a lasting memorial of these men, the entire membership of the Club and its friends have erected a library, connected with the Club building.



Detail of the Fireplace in the Memorial Library

This library was dedicated in May, 1922, with impressive ceremonies. Among the speakers was General Edwards, representing, as an army official, the three men to whose memory the library is dedicated. President H. H. Kendall of the American Institute of Architects, C. Howard Walker and President Niels H. Larsen of the Club also took part in the dedication. It is one of the largest and finest architectural libraries in the country. Through a committee of the Atelier a fund of nearly $10,000 was contributed by members and friends of the Club, and the present library was erected, under the supervision of Bellows & Aldrich, architects, assisted by other friends. On the shelves today are the libraries of Robert S. Peabody, Charles Brigham and William Gibbons Preston, as well as that of the Club itself, which was a good collection even before Mrs. Peabody added her late husband's books, and Mr. Brigham his. The arrangement of the books has been the work of Robert P. Bellows, a nephew of Mr. Peabody, and a member of the firm that designed the library.

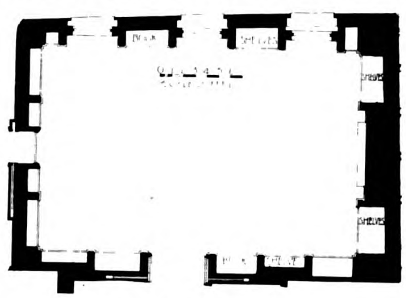
The whole community will feel that this group of architects and their assistants, constituting the Club, has done impressive and fitting honor to those of its number lost in the great war. Today the Club is experiencing a strong "come back," and among many new undertakings has established with the Boston Society of Architects a joint standing committee for the adjudication of matters in dispute between architects and their men, and the general bettering of relations between these two bodies—master and apprentice—in the profession. The committee is undertaking to strengthen the solidarity of the profession—to stand for those ideals of mutual confidence and fellowship among all engaged in it, which animated the famous guilds of the middle ages. A movement is under way, with promise of success, for the joint use of the club house by the Boston Architectural Club and the Boston Society of Architects, members of both

organizations having voted in its favor. This, with the enlargements in view, would give the architects of Boston a center of great value as a symbol of their importance in the community.

Members need not be architects, present or prospective. Kindred spirits are welcomed among the habitués of the "hall." The craftsman, sculptor, painter, musician, and even the minister, contribute to the daily disputations. When a fortunate member returns from Bermuda or Brazil, his water colors are forthwith demanded of him and hung under the tapestries for all to see. Every year there is a grand exhibition of the notable work of the twelvemonth. Each season, too, a book is published, compiled by the members, and containing material concerning some phase of the profession's activities, measured drawings, rare photographs, etchings or descriptive material of one kind or another which is apt to be of general interest.

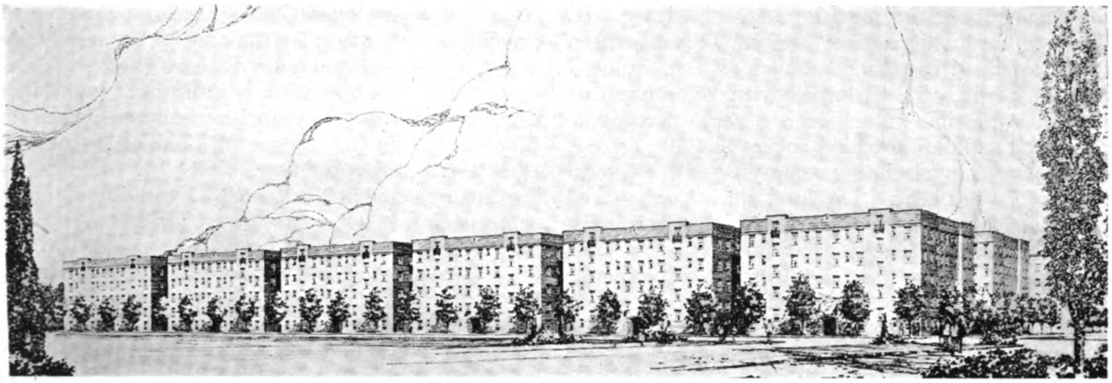
The Club's activities do not all come under its wonderful old roof; for many years its "excursions" have been the envy of all who could not share them. Visits *en masse* to the famous iron forges of Koralewsky and to Kirchmayer's wood carving shop, to brick yards, stone yards, lumber yards and navy yards, iron works, power plants and finish shops were interspersed with outings to the famous old hostelries and historical shrines of Plymouth, Salem and other cities of eastern Massachusetts. Not content with that, a vast throng made a pilgrimage to Providence and were piloted through its distinguished capitol and famous university. Wishing more worlds to conquer, the throng next found itself gazing heavenward at the higher miracles of lower Broadway, examining the secret panels of the Morgan Library on 36th street, and lost in the vastness of the Pennsylvania Concourse and the kitchens of the Biltmore. Then came the great crusade. Washington was visited in a body, and its many wonders noted. It is not beyond the possibilities of this group of earnest investigators to carry their field-visits, in these dry days, to Quebec and Montreal.

Meanwhile, and in spite of their vagrancy, they are always "at home" at 16 Somerset street to all loyal friends of the great profession who may find themselves in Boston. There you may break bread with them if you will, and join in the fellowship of the "Draftsman's Guild." The best of life is fellowship in a common quest; nothing can rival the devotion of a band of like-minded men to a great work. To the glow of the struggle is added the reassurance of support and sympathy, and the intimacy of such comradeship is the quintessence of life. Such a fellowship has crowned the efforts of a generation of loyal devotion on the part of Boston architects and draftsmen, and the Club is its symbol.



Floor Plan of Library

New Memorial Library, Boston Architectural Club



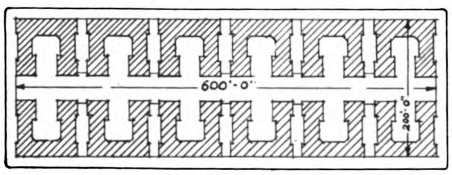
A Mammoth New York Housing Operation

METROPOLITAN LIFE INSURANCE COMPANY BUILDS FIFTY TENEMENT HOUSES

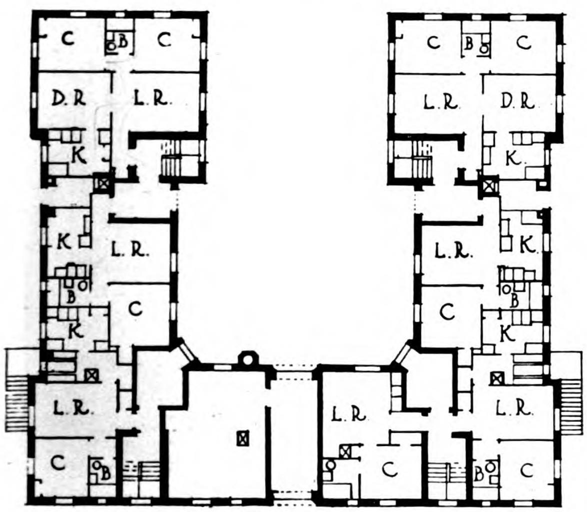
ANDREW J. THOMAS AND D. EVERETT WAID, ASSOCIATE ARCHITECTS

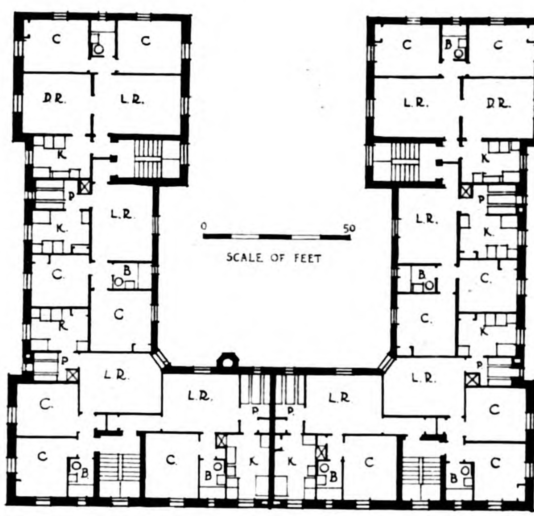
HOUSING shortage has been a serious problem for a long time in New York, and due to public interest in the subject state legislation to relieve immediate conditions has recently been enacted. One of the new laws enables insurance companies to invest amounts up to 10 per cent of their assets in housing. The Metropolitan Life Insurance Company, long actively interested in building loans, has in accordance with the new legislation this month let contracts for the construction of the first portion of a group of low-cost apartment houses that may possibly involve ultimately an expenditure of $100,000,000. The requirements which had to be met before this work could go ahead were that the buildings should be built at a cost permitting a return of 5½ per cent on the investment, to be realized from rentals of $9 per room per month, including service of steam heat, hot water and electricity. This has been accomplished, and in addition a type of house has been planned that marks a great advance over previous city housing in the provision of light, air and sunshine.

The architects of this work are Andrew J. Thomas and D. Everett Waid, associated, and the plans show the complete application of the theory



Typical Block Plan





© Andrew J. Thomas and D. Everett Waid, Associate Architects

Ground Floor Plan

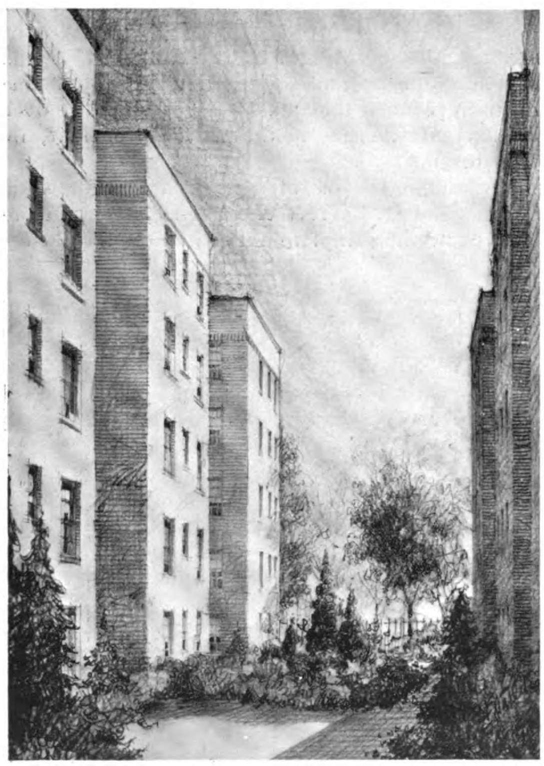
Typical Floor Plan

of tenement house planning developed by Mr. Thomas through years of study. This has been fully explained in previous issues of THE FORUM* and may briefly be described with the statement that it is possible to achieve the same percentage return on a building which covers but 50 per cent of the plot as in a building complying with the legal limit of 70 per cent. The land that is thus freed provides large openings through the block in each direction and produces what Mr. Thomas calls "block circulation." In addition to the greater amount of ventilation provided, the rooms of the individual apartments are larger than the minimum legal requirements and, furthermore, care has been taken to provide separate kitchens, living rooms and small dining alcoves—features that previously have not been afforded in tenements, but which are highly desirable as aids in raising living standards. The insurance company has likewise shown its forethought in restricting the minimum number of rooms in most apartments to four, with the thought that a smaller number of rooms is incompatible with American conditions.

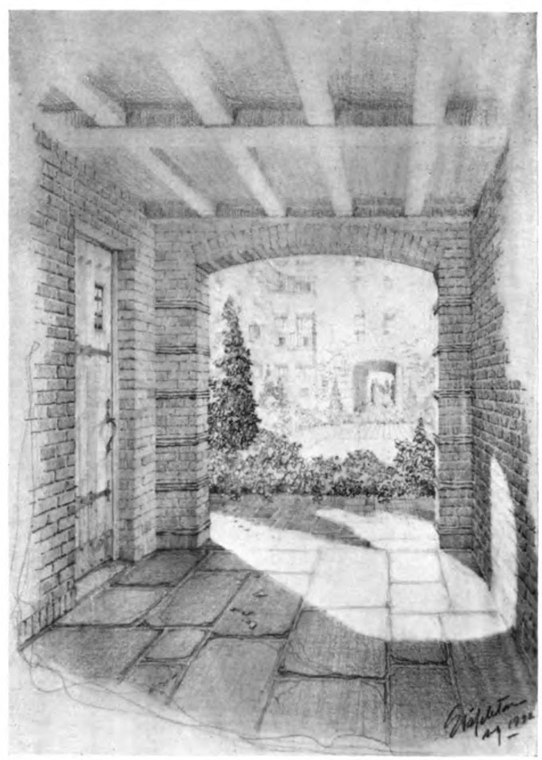
The chief economy that makes Mr. Thomas' theory workable is found in the plan of the building itself—the entire elimination of non-rentable space in the form of public corridors. Due also to the large size of the operation it has been possible to expend every thought on the plan of the one house which will be repeated many times. The vastness of the scale of this operation is indicated by the fact that it comprises 50 detached buildings, each of which is intended to house 39 families, a total of 1,950 families occupying 8,250 rooms. The buildings are arranged in blocks with 12 individual houses comprising a block, each five stories and basement high and in the form of a letter U, the solid ends facing the streets and open ends facing into an inner court or garden 36 feet wide and 600 feet long—the entire length of the block. This area is increased by the addition of the individual courts belonging to the 12 separate buildings and the 15-foot courts between buildings. The fire escapes are located in these side courts, thus freeing the fronts of the buildings of a feature that always defeats any attempt at architecture.

These buildings are being built under specifications developed through the long experience of the architectural department of the Metropolitan Life Insurance Company, which applies a system of structural standards and requirements to all building plans on which mortgage loans are made. Construction of the buildings will likewise be directly under its regular inspection system.

* June, 1919; April, 1922.



View of Rear Court with Garden Treatment



One of the Simple Entrance Loggias

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Electrical Wiring Layouts for Modern Buildings

PART VII. OFFICE BUILDINGS

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE circuit wiring of a modern office building must be designed not only to care for the building requirements, but must also be proportioned so as to permit of reasonable changes and additions to the wiring circuits from time to time to meet the needs of tenants.

When the wiring layout is made the offices, shops, etc., are not as a rule rented, nor is there any knowledge of the special requirements of the tenants or of the business to be conducted in the stores and shops. Outlets therefore must be so located that they will not only cover average requirements, but will permit of reasonable extension of the circuits with the least possible expense or mutilation of the walls and finish. Further, it is necessary on this type of building to make the feeder copper heavier than would be considered necessary if the ultimate load and demand were known, as spare feeder capacity should be provided to care for the possible addition of motors, electrical heating, display lighting, etc., as the rented spaces are developed. Special attention must also be given to the division of the feeder circuits and mains so that the service may be properly metered, both for the current used for general illumination and power, as well as the current delivered to each tenant.

Provision should be made in the wiring layout to care for:

1. Power for general use, as for elevator machines, ventilating motors, pumping equipment, etc.
2. Power service for the use of tenants, metered separately.
3. Lighting service for owner's use, including lighting of corridors, general toilets, entrances, public rooms, etc.
4. Lighting service for the use of tenants, metered separately.
5. Telephone service, general to the building.
6. Private telephone service, if required.
7. Telegraph messenger service.
8. Watchman's clock circuit and equipment.
9. Fire alarm circuit and equipment.
10. Protective equipment with outside service.
11. Door bells and signals.
12. Provision for private power and lighting plant, if desired.
13. Interior signals, if required.
14. Provision for radio equipment, if necessary.

SYSTEM OF WIRING, METERING, ETC.—Office buildings may be of first or of second class construction, and on smaller buildings even of third class construction, and while it is obvious that full conduit work must be used for all circuits on first class buildings, structures of second or of third class construction may be wired with conduits, B. X. armored wires, or (locality permitting) even with concealed knob and tube work.

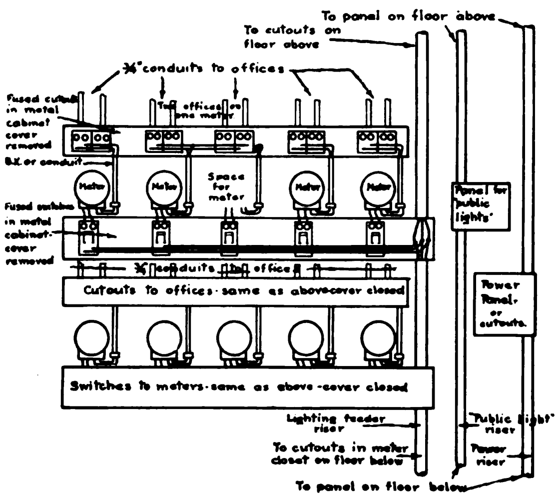
While the installation cost of B. X. armored wire or of knob and tube work will prove less than the cost of conduits, nevertheless the use of conduits for office building wiring will prove cheaper in the end, as changes are always being made in the wiring of the offices to care for requirements of new tenants. With conduit work properly installed and proportioned for this work, the circuits may be withdrawn and larger wires or additional circuits added at any time, and this at small expense compared with the cost of like additions on the other systems, or even with the cost of exposed work under metal. While the use of exposed wiring in conduits or metal mouldings, etc., is satisfactory from the standpoint of safety and convenience and may well be used for short runouts of the branch circuits, any amount of exposed work of any type cannot but detract from the appearance of the finished offices, will act as a collector of dust, and will not be as satisfactory as concealed wiring.

In general, the wiring circuits of a building become a network from the point of the service to the panel-boards and distributing centers, and from the distributing centers to each and every circuit and outlet connected with the system, each circuit in proper relation to the whole. In an office building, however, there may be not one but several networks, each being independent of the others and yet so arranged that any and all may be interconnected if desired for metering and control.

The public lighting for the corridors, general toilets, elevators, building entrance, marquise, electric signs, etc., must be metered and controlled apart from the lighting service supplying the offices, etc., while likewise the power used by the building is metered and controlled independently of the power service supplying the tenants. Few office buildings are now erected solely for office purposes, as the street floors and at times even the second and third floors will be developed as stores and shops, and these again must be separately controlled and metered for both power and lighting service.

Certain of the larger office buildings may have

their own private lighting and power plants, used to manufacture current in conjunction with the steam heating system, the exhaust steam from the engines being used for heating during the winter months and for the heating of water during the summer. The plants may be used to manufacture all of the current used by the buildings, or may manufacture but a part of the current used, the remainder being purchased from the local service company. When this is done a breakdown service or overthrow switch is installed in the engine room, the center poles connected to the feeder buss bars of the switchboard and the outer connections to the generator and to the service lines, thus permitting the building to be served from either the outside lines or from the local generators at will.



Arrangement of Meters and Cutouts in Meter Closets of Building

While with the use of a central lighting and power plant it would be possible to deliver current to the tenants either at a flat rate per month or to include the lighting and power service as a part of the rental of the office, etc., this as a rule will prove unsatisfactory, as it will be impossible to regulate the amount of current that each tenant will use, and the general use of high power lamps, electric radiators, fans and other equipment may overload the circuits and prove a source of considerable loss. As a result it has been found advisable to meter all current used, whether this is supplied from a private plant in the building or by the service company.

Like all other commodities, electric service is sold at what may be termed wholesale and retail rates, and the cost per kw. hour becomes less as the number of kw. hours used per month increases; thus, if all of the current used by an office building were sold through one meter, the service company having no responsibility for the distribution or metering of this current on the building side of the meter, the rate would be less per kw. hour than would be the case if the same amount of current were sold to 100 tenants through 100 meters, as in the latter case the service company must furnish the meters, keep them calibrated and in repair, see that the meters are read and bills presented each month, as well as carry the separate accounts.

Many owners take advantage of this wholesale, or what is more accurately termed "re-sale," rate. They purchase the current through one meter and then resell to the tenants at the same rate that the tenant would be charged by the service company. If this is done, the owners must purchase the individual meters, must see to the reading of the meters and the collecting of the bills. The difference between the re-sale and the wholesale rate is retained by the owners. The supervision of the service, however, the collecting of the bills, etc., entail more or less work and annoyance, and certain owners prefer that the tenants deal directly with the service company; again, in certain cities and towns the service company will not make a favorable re-sale rate to the owner, the company preferring to deal directly with the tenants; in either case the tenant is served through one meter, and it becomes necessary that wiring be arranged so that all current used by any tenant may be registered on one meter.

The circuits must also be arranged so that one or any number of offices may be served through one meter, as it is obvious that the occupant of a suite of offices served by one meter will obtain a better rate than would be the case if several meters were used to register the current.

The older practice covered the installation of a meter in each individual office, the cutouts being located in each office, and a horizontal conduit connecting all cutout boxes on each floor. In this way one or several offices could be connected to register on one meter, as inter-connecting wires could be drawn into the horizontal conduit permitting this to be done. This, however, has not proved satisfactory and in many cities it will not now be permitted under the local rules.

Under present conditions it is best to provide a separate meter room or meter closet on each floor, and to run all lighting circuits from each office direct to this meter closet, the circuits terminating in fused cutouts. All circuits for the general lighting of each of the floors are also carried back to and terminate in cutouts in the meter closet. The meters are installed in the closet, and it is a simple matter to group any number of the cutouts and circuits on one or more meters, permitting the offices to be metered either singly or in a group.

In the larger buildings, and where the lighting circuits from the offices average more than 80 feet in length, two or more meter closets should be provided on each floor, each closet to control the circuits covering a certain zone with an average length of the circuits not exceeding 80 feet. If it becomes necessary to run circuits 100 feet or more in length, the wires used on these circuits should be No. 12 B. & S. gauge in the place of the No. 14

wire as commonly used, while if like circuits are carrying from 1000 to 1320 watts, not less than No. 10 wire should be used, the larger wire compensating for the increased resistance due to the length of the circuit.

For a smaller building it is sometimes good practice to locate the meter room in the basement and to carry all circuits from the offices down and terminating in cutouts in this meter room. This is common practice in apartment hotels as it permits the meter reader to read all meters without entering the apartments. The stores or shops on the upper floors may also be metered from a closet on the respective floors, while with the stores on the first floor the meter is best located in each store basement, as the stores are as a rule heavily circuited to care for general illumination, display lighting, window lighting, electric signs, etc., and it is less expensive to locate the meters in the basements than to run all of the circuits back to a meter closet on one of the upper floors. Again, with the meter in the basement the full control of the circuits is within the store and fuses may be replaced without the necessity of entering the office building.

The public circuits on each floor are carried back to the respective meter closets and are terminated in cutouts. These cutouts, however, are connected on the public riser circuit, there being one meter installed. This as a rule is located in the basement. All power circuits for control of building motors, as for elevators, ventilating fans, pumping equipment, etc., are as a rule metered at the point of the entering service, a master switch at this point controlling the building power riser or feeder cables, all motors throughout the building being connected through proper cutouts to feed from this riser. This will give satisfactory results.

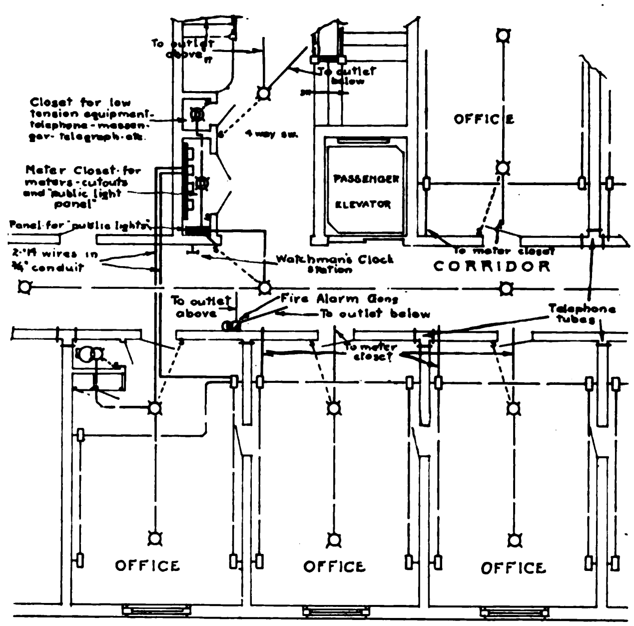
Where power is required for the tenants, a separate riser is carried from the point of service, the riser passing up through the meter closets and branch cutouts being located in each closet permitting branch power circuits to be carried from the meter closet to the offices or shops, the meter in each case being located at the junction.

Wiring of Offices. In the lighting of the offices provision must be made for general illumination, for the lighting of desks, for the use of electric fans and portable equipment, and for the use of motor-driven office machines. Where a furniture layout is available the lighting outlets may be accurately located with reference to the furniture. As a rule, however, no furniture layout can be obtained, and the outlets must be so placed that they will best meet average requirements. It is good practice to provide one ceiling outlet for general illumination of the smaller offices, with two or more ceiling outlets for the larger offices, these controlled from several switches at the entering door.

In general offices or accounting rooms, where a large number of desks may be used, it is well to provide a number of ceiling outlets, spacing these uniformly an average distance of 12 feet apart and 5 or 6 feet from each wall. This will give good average illumination without the use of individual lights on the desks. Private toilets may be lighted either by means of ceiling fixtures or by means of bracket fixtures located at the left of the mirrors; the lighting of the toilet should in all cases be controlled from a switch at the entering door.

Provision may be made for the lighting of the desks either by means of bracket fixtures or by means of wall receptacles. Of the two, for office work the receptacles are to be preferred, as they allow more or less leeway in the locating of the desks, and when the receptacles are set in the baseboard the wall space is left clear. Double receptacle outlets may be used in these locations, and these will provide also for the use of wall or desk fans or for two or more portable fixtures.

A fitting which is now being made by several of the manufacturing companies is standardized and consists of a special type of flush receptacle. It is intended to be mounted in a standard switch box and at the general bracket height of 6 feet, 6 inches. These receptacles are set flush with the wall and permit the use of any standard receptacle plug. They are also furnished with a special plug which is designed for mounting on the stem of a bracket fixture, the circuit wires terminating in the binding screws of the plug, thus making a self-contained unit. The brackets are then simply plugged into



Typical Floor Layout of Average Office Building Showing Meter Closets, Corridor and Office Arrangement

the receptacle and are held rigidly in place by means of a catch. With the use of this fitting, it becomes possible to make use of bracket fixtures or portable equipment from any plug at will, or to remove and replace bracket fixtures, or to interchange the fixtures in the office, this being done without tools of any kind and with no more effort than is required to shove the fixture into place. These fittings may be used also for ceiling outlets, and their general use would permit the tenants to own their lighting fixtures, to remove and replace the fixtures for cleaning, or to change the type of fixture at any time without the necessity of calling in an electrician.

Where offices are to be fitted with baseboard receptacles it is well to provide four receptacles for each office, and where the office is located on the second or even the third floor, it is well to provide an additional receptacle, this located at a point near the window to permit the possible use of window signs. All receptacle outlets should be connected to circuits separate from the ceiling illumination; thus in the event of one fuse blowing and opening the circuit, the offices will still have light from the receptacles.

Outlets in different offices should not be connected to the same circuit, as each office should be metered separately. The conduits from each office to the meter closets should be not less than ¾ inch, even if but one circuit is required, as this provides spare conduit capacity in the event of additional circuits being required in the future.

Entrance and Stair Halls, Etc.—The entrance lobby and vestibule may be lighted by means of indirect lighting with the units concealed in coves, or by means of ceiling pendants. If cove lighting is to be used, it is important that the cove be properly designed so that the ceiling may be evenly lighted.

All lighting of the entrance lobby, vestibule, marquise, stair halls, elevator cars, etc., as well as the lighting of electric display signs should be controlled from some point near the entrance or in the first floor corridor, all circuits from the lighting outlets being carried back and controlling from a panel-board. If the office of the superintendent or janitor is to be near the entrance lobby, the panel-board may be installed in this office, and thus the control of the public lighting be put under the superintendent or janitor. Furthermore, the riser circuits feeding the public lighting of the upper floors may be mastered by switches on this panel-board, the riser circuits passing through the panel-board and thence connecting to the public cutouts in the meter closets. In addition, however, the public lighting of the different floors should be controlled by local push-button switches, these set at the entering doors of the toilets and general rooms and at a point near the elevator for the corridor lighting, and corridor lighting should be controlled on two circuits, each circuit feeding one-half of the illumination of the corridor. The switches may be of the push-button type or of the lock type in which a key must be used for the operation of the switch; this permits the mastering of the corridor circuits from the panel-board in the office, and the individual control of the lighting by the janitor or by the elevator operator as required.

Where red lamps or exit signs are used at the doors entering the stair wells, or elsewhere throughout the building corridors, the circuits connecting these outlets should be carried back and controlled from the panel-board in the superintendent's office, and a separate feeder should be carried from the service switch to the panel for the control of this exit lighting, this feeder connected to the street side of the main service switch, so that the exit lighting will not be disturbed in the event of the opening of the fuse of the building service.

There should be one outlet provided for the lighting of each of the elevator cars, this outlet located in the well shaft and at a point halfway between the basement and the top floor; wires should be left at the outlets in readiness for connection to the flexible cable supplying lighting to the elevator cars. The flexible cable and all connections to these outlets are always made by the elevator contractor. The outlet for the lighting of the elevators should be controlled from a separate circuit from the panel-board and should not be connected to circuits feeding the lighting of the corridors.

Where display signs or posters are to be used at the entrance, the circuits feeding these signs should be carried back and controlled from the panel in the office; all circuits from outside brackets, torches or pedestal fixtures for the lighting of the entrance should be carried back and controlled from the panel.

Where an electric sign is to be used, either at the roof or at the entrance to the building, the master circuit feeding the sign should be controlled from a fused knife-switch on the panel in the office. This circuit should terminate in a steel cutout box set at some point convenient to the sign. All fused cutouts protecting the individual circuits should be mounted in this cutout box. The box should be as near the sign as is possible, and all wires from the cutouts to the sign should be run in one large conduit, this terminating in a weatherproof entrance bushing. There should be one double pole cutout in the box for each 1320 watts required by the sign, and under average conditions, there should be allowed 12 ten-watt lamps for each 12-inch letter. If a border or scroll is to be used in addition to the letters, there should be 4 ten-watt lamps allowed for each lineal foot of border or scroll. The wiring layout should include all wiring from the panel to the cutout box, including the complete equipment of cutouts, and the empty conduit from the box to the sign; the circuit wires from the box to the sign including all connections between the sign and the cutouts are, as a rule, included under the sign contract.

Organ Installations

By C. A. WHITTEMORE

IT was only a few years ago that the installation of a pipe organ in a theater or public building was looked upon as an epoch-making event. These installations have now become so common and the installation of pipe organs in fine residences is such an everyday occurrence that it no longer is of particular interest. It is, however, a fact that architects and engineers as a rule have not kept pace with the changes made in organ construction and in organ installation. This is too frequently evidenced by the scurrying around, after it has been decided to install an organ, to find the proper space to put it. Where there is even a remote possibility of an organ's being installed in a building it should be carefully considered in the preliminary plans so that space may be left not only for the organ pipes and the keyboard and console, but also for the wind trunking and the electric conduit.

The organ itself is divided into three divisions,— the organ or organ chamber, the key desk or console and the blower. These three units may be placed in close proximity to each other or they may be widely separated. From the key desk to the blower there is usually a 3-inch, spirally-wound galvanized iron pipe with tightly sealed joints. Sometimes this is connected directly with the main trunk line from the blower and sometimes from one of the wind chests in the organ itself, where a standard pressure is maintained. This pipe is used frequently to control the action of the keys, in which case it is a pneumatic-action organ, at times used merely as an auxiliary to the electric control and at times merely to register the volume of the organ pressure. From the key desk in an electric-action organ extends a cable in which, in addition to spare wires left for the purposes of repairing any breakdown on any of the circuits, there are wires corresponding to each stop or note on the key desk.

The valves in the organ chamber which cause the "speaking" of the pipes may be actuated electrically or directly by the wind pressure. In the old days these valves were actuated by thin strips of selected wood to which were fastened threaded pins which made a direct mechanical connection between the key and its corresponding pipe. This was called the "tracker action" organ and is now obsolete. With the old tracker action type and with the pneumatic type the key desk is definitely fixed in position. With the electric-action or the electric-pneumatic (in some forms), the key desk may be picked up at will and moved to any location within the limits of the length of the cable.

The organ chamber, or the sound part of the organ installation, is divided generally into three main sections,— the pedal, the great organ and the swell organ. The pedal organ, as its name implies, consists of that part of the speaking pipes which is directly controlled by the foot pedals. The great organ is usually composed of some of the louder, sharper-voiced pipes and the volume is controlled by a set of shutters in front of the opening from the organ chamber into the auditorium. The swell organ is usually composed of the softer and sweeter pipes and is enclosed in a separate box with a separate set of shades and shutters, the whole construction being enclosed in the main organ chamber. When the main shutters from the organ chamber and the shutters to the swell chamber are closed, the tone will be very soft and remote in effect. The opening of the swell shades produces a little more tone. The opening of the outer shades gives the maximum tone of which the swell organ is capable. These modulations of tone volume are also applicable to the pedal and the great organ, excepting that between these two sections and the auditorium is interposed but one set of shutters.

The swell shutters and the main shutters are graduated, that is they do not all start to close or open at the same time. Every fifth shutter may operate in unison so that the gradual opening effect would be one, five etc., two, six etc., three, seven etc., until the shutters are all open. Some of the organ manufacturers prefer to open them in sections such as one, two — three, four — five, six, and when the first section of shutters is part way open, the second section begins to open. This study of shutter control is a matter of great importance and the desired effect is a gradual increase of tone rather than a sudden break from comparative quiet to maximum volume.

The organ blower is located in the organ chamber at times, and at other times in a part of the building not too remote where the air is as clean as possible. If the air is taken from a room in the basement where there is likely to be dust it will not be long before the dust is blown into the organ chamber and reeds and pipes are soon put out of tune. It is therefore desirable to see that the supply of air is as clean as possible. The blower is usually a direct-connected fan type blower, and from a seçondary pulley on the main shaft is belted a small generator set. The generator set will furnish the low potential current for the electric action of the organ itself, so that on the organ side of the blower there is no current heavier than from 10 to 12 volts.

There is, and always will be, a tremendous discussion between the various organ manufacturers as to whether high or low pressure is best. Some contend that high pressure, which means of about 15-inch water column, gives too harsh, blatant a noise; others contend that low pressure, of not over 5-inch water column, is too soft and limpid for bold effects.

There can be no question but that the voicing can be adapted to either method. The voicing and tuning and selecting of pipes for an organ is one detail of organ work with which the architect is seldom familiar, and it can hardly be expected that with the many other things an architect must study he should also take up the study of organ construction and specification.

In the case of competitive bids from various organ manufacturers, a glance through the specifications, which really means the detail of how the organ is to be constructed with the selection and number of pipes, will reveal some interesting things. One organ manufacturer may give 19 sets of pipes ranging from 32 for the pedals to 69 or 72 for the great and swell organs. Another manufacturer on the same set of specifications may indicate a certain number of pipes and some sets of "notes." This would mean the same thing to one who does not understand organ construction, but there is a vast difference. When an organ manufacturer specifies the number of pipes and proposes to install an organ in which a certain number of pipes and a certain number of notes are specified, he means that some of the stops (two or more) may cause the tone to be produced from a single set of pipes. This is sometimes called "borrowing" or "duplexing." One manufacturer is putting in far more material, far more wood and far more metal in his construction than the other man who is merely taking one set of notes from one bank of pipes and altering them to represent two different qualities of tone.

The average theater organ for houses of not over 2,000 or 2,500 capacity will occupy a space about 14 feet square by 18 feet high. This space should be clear of all obstructions, as many of the pipes are actually 16 feet long. Frequently the organ is divided into two parts, one part on either side of the stage. When this is done, the division of pipes should be very carefully arranged or the effect will sound a great deal like an old German street band. In the Capitol Theater in New York there is a divided organ which is so well arranged that the average hearer cannot detect the exact source of sound.

The opening from the organ chamber into the auditorium should be kept as clear as possible. The average size opening from the great chamber would be approximately 8 feet high by 14 feet long. This is an ungainly size of opening to treat in a decorative sense, so that the first thing the architect usually likes to do is to arrange draperies and overhangings in front of these openings. This immediately has a tendency to deaden the tone and render the organ much less valuable. The architect should, on the other hand, design these openings and arrange them as may best suit his design, but also arrange his draperies and hangings so that nothing will interfere with the clear passage of the tone. It is not absolutely necessary to have these openings always of the size mentioned, but the total net area of the grilles through which the tone is admitted should be approximately this size.

Many theaters have organs arranged in or near the upper box level, separated from the auditorium by a soundproof partition with the openings in the proscenium arch itself. Sometimes these openings take the form of decorative grilles extending all around the arch. Often these openings become lattice grilles at intervals in the arch with solid panels between, and sometimes the openings are specially designed to form a distinct part of the architectural treatment of the arch itself. In figuring the net area, it is quite necessary to calculate this from the full-sized details rather than from the scale drawings, so as to be sure to allow the full amount of opening.

In some theaters the organs are located directly on the stage in back of the construction work. With a 35-foot stage one can readily see that an organ space at the extreme rear of this, if built in a separate compartment, would be at some distance from the main auditorium. A situation of this character is not quite so desirable excepting in theaters where a permanent stage setting is desired, such as a large motion picture house, for example, where vaudeville features may or may not be added. The stage for "legitimate" performances could not be all broken up with such an obstruction. In this case it would be necessary to build, as previously suggested, outside of the walls of the stage entirely.

The construction of these walls should be properly studied and prepared with reference to the finish on the organ chamber side. All of the walls surrounding the organ room should if possible be constructed of brick or concrete and then plastered on the surface with a hard plaster and smooth troweled, as this gives a very hard, non-absorbent surface from which the tone will be readily reflected.

If the organ be placed in a position where the tone is not directly admitted to the auditorium, it may be desirable to install deflector boards for the purpose of bending the sound waves in the direction desired. The best analogy to a situation of this kind in determining the deflector boards as to position and angle is to assume that the sound waves act exactly as light waves, and then to assume that the deflector boards may be replaced by mirrors. In this way one can readily calculate with reasonable accuracy the distribution of the sound. These deflector boards should be constructed very rigidly on an angle of channel iron formed with wire lathing and secured in position by a permanent structure after the exact angle has been determined. Then the whole surface should be coated and smoothly troweled with hard plaster.

Plate Description

Hospital for the Illinois Central R.R., Paducah, Ky. Plates 5, 6.

This structure, of which Richard E. Schmidt, Garden & Martin are the architects, is intended for the care of the employes of the railroad and, when space permits, for the general use of the community. The plans make provision for the white employes of the railroad, for colored employes, and for others who may be admitted as patients, as well as for an out-patient department to care for the ordinary medical treatment of ambulant cases. The building is of a Georgian type, an architectural style which agrees well with the traditions of the south, of sand-faced brick with quite a variety of color and laid in Dutch cross bond. Sills, etc., are of stone and columns, cornices and other exterior trim are of wood painted white. The construction is fireproof, the base course being of concrete with special finish, and floors of tile, concrete and terrazzo. The pitched roof is of wood covered with slate.

At the entrance the main office is so located that the out-patient waiting room is at one side and the hospital reception room at the other, with control of all corridors, entrances and exits of the building. Since the structure faces south the more important departments are placed upon this side and the auxiliary rooms and offices upon the north, the few patients' rooms which have a northern exposure being not objectionable since the heat of Paducah in summer is accompanied by high humidity. Particular care has been taken to insure wards and patients' rooms that should be comfortable during long, hot summer days. This has been accomplished by means of ventilators, properly placed, and the results have been satisfactory. Sun porches are provided upon both the lower and the upper floors at each end of the building.

The kitchens, storerooms, pantries and dining rooms for nurses and patients have been placed in a wing at the rear of the building, and the third floor of the central part of the structure, which from the exterior has much the effect of an attic story, is occupied by the operating rooms and the offices which belong to them. Heating is supplied from a separate building which was part of a former hospital upon this site. The hospital is planned for the accommodation of 98 patients and a personnel of 14; the contract was let in July, 1918, and the cost was 38 cents per cubic foot.

Administration Building, New Haven Hospital. Plates 7, 8.

This late addition to the buildings of the medical department of Yale University is one of a group of two. These structures have been designed in a modified Georgian style, such as was used for several of the earlier and some of the more recent of the Yale buildings, the walls being of brick laid in Flemish bond, the headers of different shades ranging from light to very dark and laid at random. The cornices and trim are of cast concrete stone.

The Administration Building, dominating the group, is of fireproof construction with reinforced concrete columns, girders, etc., and hollow tile floors, the floors being finished with granolithic surfaces to which linoleum has been applied. For the toilet rooms the floors are of tiles with a tile base. The partitions and furrings are of gypsum blocks, and walls and ceilings are of gypsum plaster, painted. For the interior trim mahogany has been used upon the lower floor, and elsewhere use has been made of Wisconsin red birch, all this woodwork being varnished. In toilet rooms all woodwork has been painted and enameled. Stairways are of iron with platforms and treads of gray Tennessee marble; vacuum steam heating system, direct radiation, has been installed, a central power plant affording steam and vacuum supply.

Anthony N. Brady Memorial Laboratory, New Haven, Conn. Plate 9.

Details of this pathological laboratory structure are in general quite similar to those of the Administration Building of the New Haven Hospital, with which it is connected by a glazed corridor, but the granolithic floors have been treated with a floor hardener and left exposed; Wisconsin red birch, varnished, has been used throughout for interior trim, but slate has been employed instead of marble for the platforms and treads of the iron stairways. High pressure steam is used for sterilizers. The basement of this structure is planned with many of the departments required in a pathological laboratory building, and in addition to the usual lockers and toilets it contains dark and projection rooms, animal and inoculation rooms, a machine shop, a mortuary room complete with freezing box, refrigerator and incinerator, and a large space for museum storage.

This building was planned by the architects in groups of units each 12 feet, 3 inches, lengthwise of the structure on each side of the central corridor in each story. Each unit is provided with a vertical pipe chase with a horizontal pipe trench connected with the chase. By this arrangement pipes can readily be changed or new pipes installed for any particular unit. Each of the units is, or can be, supplied with hot and cold water, gas, compressed air and suction, together with electricity for laboratory work.

House of Arthur K. Bourne, Esq., Pasadena, Calif. Plates 13, 14.

This house suggesting the old adobe buildings is of frame construction with exterior cement plaster of soft white tone. The trim is white and blinds blue. The roof is of California redwood hand split shakes. The house is heated by hot air from gas furnaces in the basement.

EDITORIAL COMMENT

SOME SIDELIGHTS ON THE CONVENTION

IT has perhaps not been sufficiently recognized that one of the very important and constructive results of conventions of the American Institute of Architects has been the opportunity for interchange of experience and ideas along practical lines of office administration and the promotion of practice. Because of limitations of time these and many other points of general interest are not discussed in regular meetings, but during the hours not given over to regular proceedings one will find interested groups discussing matters that are of concern to architects everywhere.

One topic of special importance at this time is the definite shortage of draftsmen that has resulted from the sudden increase in activity in architects' offices. During the dull period through which we have just passed many of these men left the profession to enter other lines of activity which offer less fluctuating conditions of employment. This brings up an old but interesting subject of discussion, that is, the methods and importance of holding together an office organization in order to assure steady employment to good men and to relieve the distressing conditions of under-supply in times of demand, and insecurity from the draftsmen's viewpoint during lean periods. Several architects who occupy important positions in the profession are now introducing a definite system to meet this situation. The important principles of such an organization method involve a sinking fund, established and developed during times of activity and prosperity for use in less active times, to insure the salaries of important members of the organizations. It is quite evident that until the seasonal problems of the construction industry are solved architectural practice will be somewhat seasonal in its nature and certainly subject to cycles of variation from activity to inactivity, but this can be discounted to a large extent through careful organization

The importance of developing a capable organization merits serious consideration of a profit-sharing system which shall apply to all those in the office who do creative or constructive work. The sinking fund idea is excellent, and there is no question but that some form of profit-sharing introduced in a feasible manner would have an important bearing on the loyalty and efficiency of employes. It would likewise have considerable influence in keeping capable men together in one organization, and there would be less splitting up into small units —a result greatly to be desired in view of present developments in the relations of the architect with his clients and generally with the business world.

AT no time in the history of the profession has so much interest been shown in the economic phases of architectural practice. Architects everywhere are indicating a rapidly developing interest in business methods as related to the construction industry, in the financing of building operations and in various phases of promotional and speculative building operations and real estate development. This point was emphasized by George C. Nimmons in his talk at one of the group luncheons. One architect, whose business is sufficiently large to justify a payroll of nearly $9,000 a week, named as the most important factor in the development of his practice his ability to gauge costs accurately. In his office he maintains capable estimators, and when quoting the cost of a prospective building every effort is made to cause no disappointment by naming a figure so low that contractors' figures and ultimate costs are in excess. Often he is able to complete building projects at costs lower than his estimates, which is always a pleasant surprise to the client and a guarantee of pleasant future relations.

Another indication of changes in practice is the general consensus of opinion that we are entering an era of specialization in architectural design and that every architect should develop at least one logical specialty which will insure a steady clientele for that particular class of buildings.

Casual discussion of the question of building finance indicated two important facts: First, that there is today an ample supply of mortgage money for reasonable investment in practically all parts of the country, and, second, that architects are taking an intelligent and constructive interest in this question of building finance. Many factors are working to place the building industry in a more favorable light from the viewpoint of both the general public and various types of banking and loaning organizations. Building as collateral security for bond issues and mortgage loans is before the public eye in a constructive manner, unequaled in the past. Many architects report that mortgage loan interests are giving more credit to good architecture and greater study to proper planning than formerly. The high cost of building has definitely stressed practical requirements which involve planning for efficiency of purpose and the expression of good architecture without a great increase in investment. Everywhere architects seem to be giving more careful study not only to the reduction of original construction costs but to the use of permanent materials and good equipment which will serve to cut down the factors of obsolescence and maintenance cost. Successful efforts in this field will be of the greatest benefit in establishing the economic value of architectural service.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED PROFESSIONAL & DESIGN INTERESTS WITH SPECIAL REFERENCE TO AVAILABLE MATERIALS

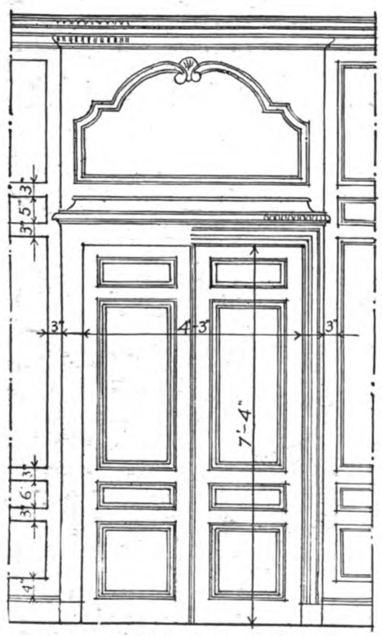
Use of Eighteenth Century French Precedent

INTERIORS OF RESIDENCE OF CHARLES H. SABIN, ESQ., NEW YORK

CROSS & CROSS, ARCHITECTS

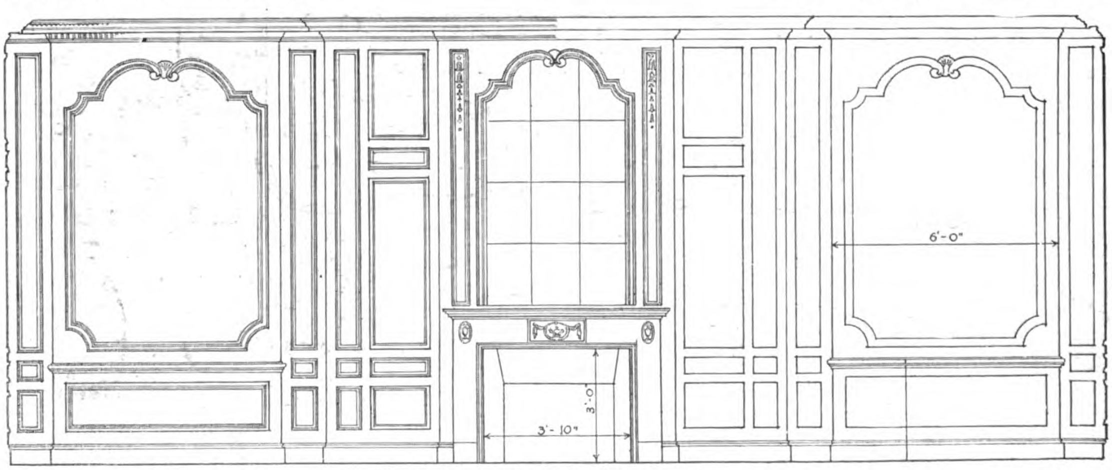
IN late years there has appeared a new interest in the classic French styles for interior decoration. In the wide range of historic European styles there is none more perfect in line, color, harmony and form than that exhibited in the eighteenth century work of France. The period was one of culture, refinement and delicate elegance. It has been unfortunate that the popular conception of the French styles of decoration in America has been influenced largely by the interpretation of the commercial decorator, who in the past has seized upon the extremely ornate and frequently the least well designed examples for his models. The literal reproduction of the most rococo salons, filled with endless quantities of gilded furniture in important city houses of the past generation, aroused a prejudice against French decoration which is but gradually giving way before the present efforts of architects and decorators who, because of a more thorough and intelligent study of the style, are producing interiors that are distinctly modern, yet quietly reminiscent of the charm and beauty of the best of the originals.

The rooms illustrated in these pages are from the New York residence of Mr. Charles H. Sabin, and they show definitely the value of eighteenth century French decoration as a precedent for modern work. These rooms, decorated by Cross & Cross, architects, are of especial interest when it is known that they have been transformed from the usual stereotyped interiors found in the type of city house built for sale. The architects were not obliged to make any important structural changes, aside from a rearrangement of doors to have them open on room axes. The architectural design phase of the problem was limited to the devising of wall paneling to make the proportions of the rooms as pleasing as possible and to providing spaces for certain objects collected by the owner, such as the painted panels and lunettes that appear in the drawing and reception rooms.



Detail of Drawing Room Door

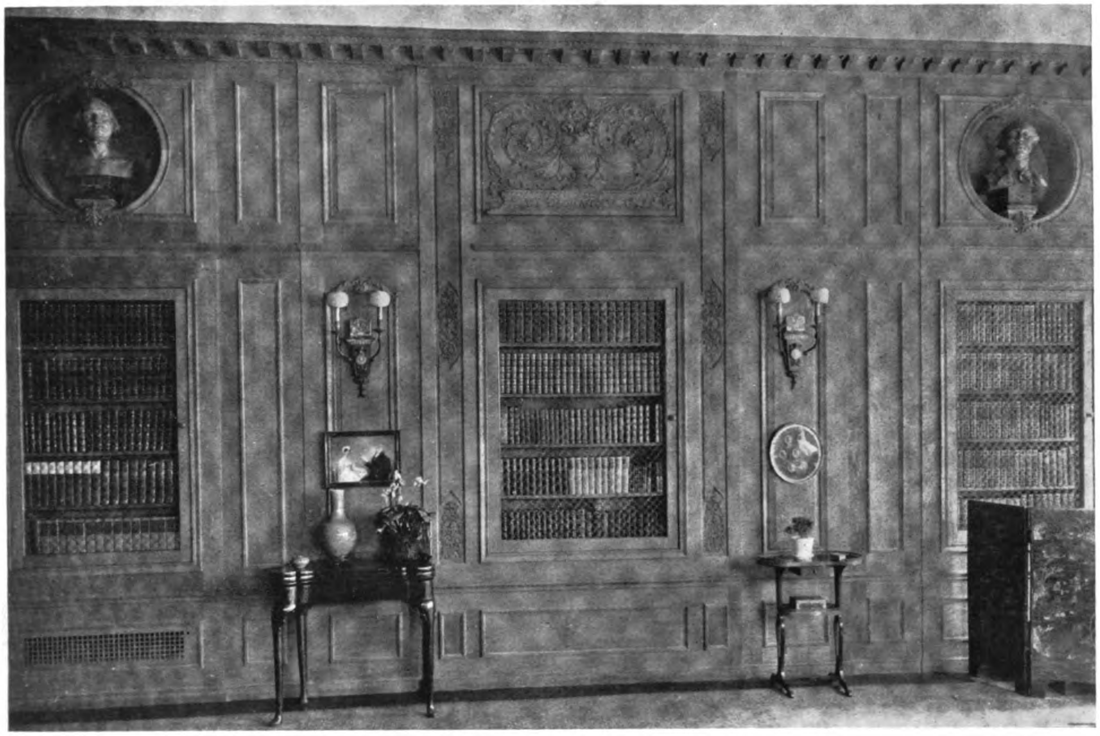
The elliptical tops of these paintings dictated the scheme of the wall paneling in the drawing room, and the ungainly proportions of the paintings have been successfully offset by the sense of height created by the rising curves of the panel mouldings. The walls are painted a greenish gray, toning with the mantel of green and white marble, and parts of the mouldings are enlivened with gold. The three windows are a striking feature of the room, decorated in a Georgian manner with looped-back curtains



Elevation of Fireplace Side of Drawing Room

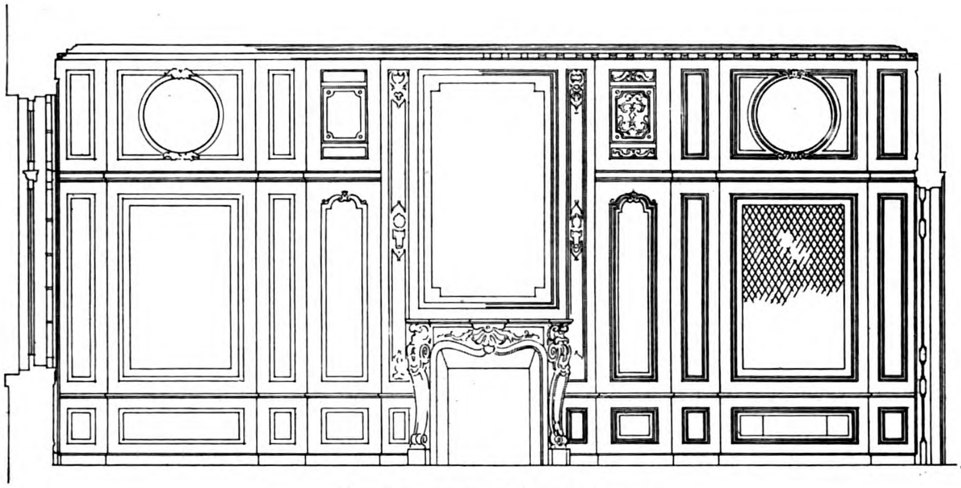
DRAWING ROOM, HOUSE OF CHARLES H. SABIN, ESQ., NEW YORK

CROSS & CROSS, ARCHITECTS FOR THE INTERIOR



LIBRARY, HOUSE OF CHARLES H. SABIN, ESQ., NEW YORK

CROSS & CROSS, ARCHITECTS FOR THE INTERIOR



Elevation of Fireplace Side of Library

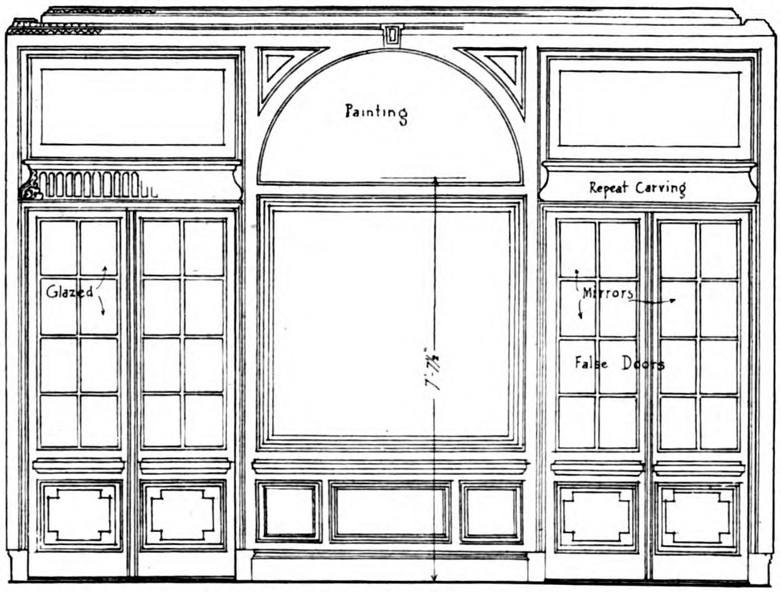
of damask in broad stripes of rose color and green.

The furnishings of the room are varied in size, color and style, though carefully restricted to one scale. The console tables below the wall paintings are cream and gold, with marble tops; the furniture is chiefly eighteenth century English with damask coverings, but occasionally bright chintzes or needlework, as in the French armchair, are introduced with excellent effect. Opposite the fireplace a feature is provided by an original French desk in black lacquer with ormolu mounts. The interesting grouping of furniture and the color in fabrics appear to advantage against the quiet toned walls and the taupe carpet.

The library is a delightful example of the modern use of Louis XVI motifs. The room is especially

Front End of Drawing Room

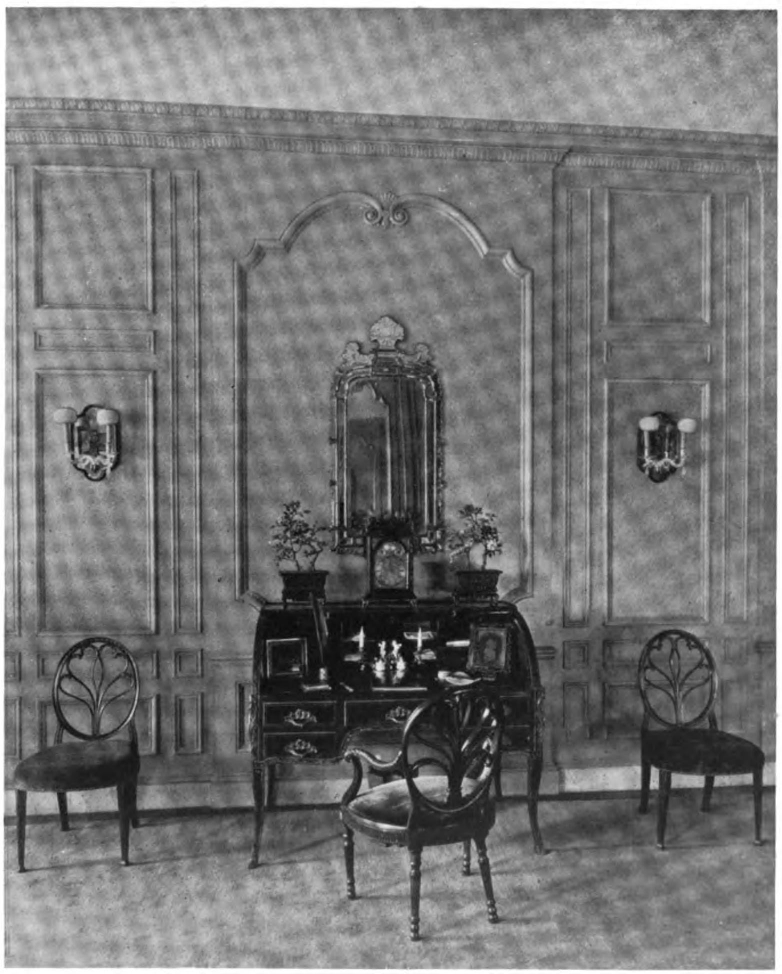
restful, and its whole effect is conducive to quiet reading. The walls are paneled in oak which was sand blasted to remove the sharp edges of mouldings and give a soft and aged looking surface. The wood was given no finish beyond a thin application of hot paraffin to seal the surface and preserve its pinkish gray color. The carved panels were executed in the spirit of two old panels brought from a rural district of France. An old marble mantel is used and above it hangs a Raeburn portrait. The dominant color note of the furnishings is blue, provided by the hangings and rug. The books are arranged in cases flush with the walls and are protected by doors



Elevation of Entrance End of Reception Room

fitted with brass grilles; above the bookcases, busts of American statesmen are set in circular niches. These originally were the usual commercial plaster casts; the stock base of each was removed and a marbleized base substituted; they were then toned and glazed to harmonize with the walls. The lighting fixtures in this room are worthy of particular note; they are reproductions of old sconces in a combination of black marble, alabaster and bronze gilt.

The dining room shows an ingenious use of paint applied to the walls in imitation of marble. The plaster was first covered with linen to give a surface free from any possible cracking; the successive coats of paint successfully eradicate all signs of the linen texture, the finished surface being smooth like that of honed marble but with no suggestion of coldness. The field of the panels imitates Siena marble, and the pilasters and mantel which are of wood, black and gold marble. The room is exceedingly simple in its design and furnishings but of great dignity and richness. Its color scheme is black, gold and green, the curtains being


Drawing Room Furniture Group Opposite Fireplace

RECEPTION ROOM ON FIRST FLOOR

DINING ROOM

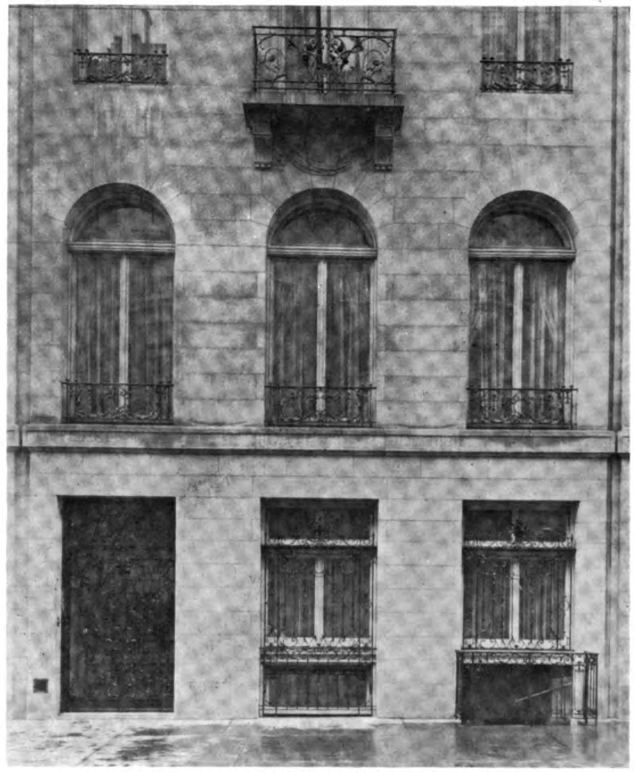
INTERIORS, HOUSE OF CHARLES H. SABIN, ESQ., NEW YORK

CROSS & CROSS, ARCHITECTS

of green silk; the chenille rug is likewise green and the furniture black and gold, the chair upholstery being green velvet. The chairs are an especially graceful type having a shield back with Adam ornament; one is an original and the others are copies.

The drawing room and library are the principal rooms of the second floor and open from a central hall after the usual plan for a city house of narrow frontage. On the first floor the dining room occupies the full width of the house at the rear; on the street front and to the right of the entrance lobby there is a small reception room which is illustrated here. This room has been paneled to accommodate a number of old Italian paintings in lunette shape which were originally a part of the set used in the drawing room. This room is more distinctly French in its furnishing and character than the others. The walls are colored a light gray and the tall windows with small panes are hung with broad curtains of old gold colored taffeta. The entrance side of the room is given a symmetrical treatment to balance the windows, as indicated by the elevation reproduced.

A principle that governed the furnishing of rooms of the eighteenth century is noted in these rooms, and to its observance probably more than to any other feature is the charm of these interiors due. There must be a very evident contrast of vertical and horizontal lines; the paneling should be counted on to give the vertical emphasis, and the furniture should be kept low and small in scale. Another means of acquiring interest that is noted in eighteenth century interiors is the use of the mirror or a large portrait over the mantel to give a focal point to the decoration, and the value of this is shown in several of these illustrations.



Lower Stories of Façade Showing Iron Grilles

Detail of Grille at Entrance

The structural changes that were made to bring doors on axes or in symmetry with other features of the rooms before a suitable scheme of decoration could be devised indicate the necessity that exists in planning of residences and other buildings where interior effect is a consideration, for determining the type of decoration at the same time the structural plan is worked out. Interiors that aspire to any pretension in finish and decoration must have symmetrical wall treatment; the placing of windows and doors, and the general disposition of wall spaces are, therefore, of direct importance from a decorative standpoint.

The detailed exterior views shown on this page illustrate the pleasing wrought-iron grilles and balconies designed by the architects as a note of embellishment and distinction to the facade. This ironwork is of French design, agreeing with the style of the house, and its execution is of the best modern craftsmanship.

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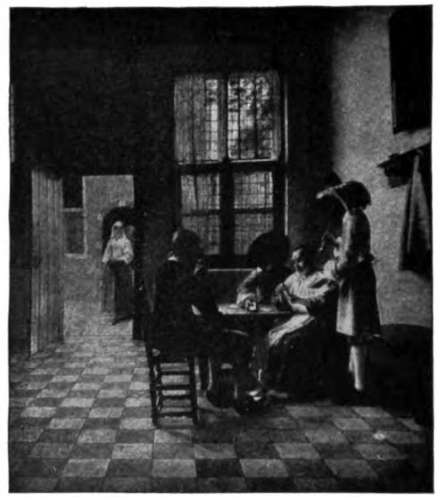

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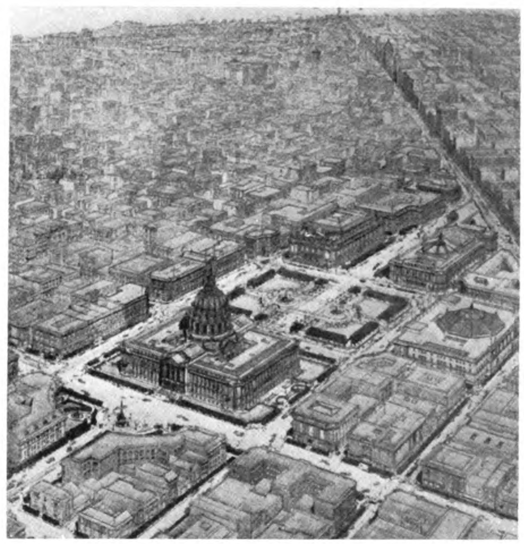
BOOK DEPARTMENT

THE AMERICAN VITRUVIUS: An Architect's Handbook of Civic Art. By Werner Hegemann and Elbert Peets. 298 pp., 12 x 16 ins. Price $40. The Architectural Book Publishing Co., New York.

IN selecting the title of this volume the authors say they have intended to place at their masthead a symbol of their allegiance to the classical ideals associated with the Vitruvian tradition. This tradition, of course, rests upon fundamentals which are clearly defined and have their basis in the forms of classic times, and its ideals are equally well defined and well grounded. The chief of these ideals, although it is frequently forgotten or ignored in these days of unrestrained individualism, is that the basic unit of design in architecture is not merely the actual building but includes the entire environment as well. Colin Campbell's precedent of including in his "Vitruvius Britannicus" only English material has not led the authors of this work to confine themselves to what has been done in America. The artistic ideal which inspired the "Vitruvius Britannicus" is not limited as to nationality, peculiar to neither England nor America, but is the same spirit which wrought architectural wonders over the whole of Europe.



Design for Civic Center of San Francisco
By John G. Howard, F. H. Meyer and John Reid, Jr.
Illustration from "The American Vitruvius"

Harmonious development of architecture requires application of tradition as well as of bold development of the inherent possibilities of such tradition into new forms, and it is certainly beyond question that in matters of plan and mass there is inspiration to be found wherever the builders have striven for order, balance, symmetry and harmony. Having outlined their position as to the necessity of considering the relation between buildings and their settings, the authors elaborate the thesis and in various chapters consider somewhat critically such important subjects as: The Modern Revival of Civic Art; Plaza and Court Design in Europe; The Grouping of Buildings in America; Architectural Street Design; Garden Art and Civic Art; and City Plans as Unified Designs. The work is lavishly illustrated with halftones, and although in the foreword and in the preface the authors disclaim an attempt to cover the entire range of expression of civic art, almost every important work of the nature indicated, in Europe as well as America, is included, and in countless instances plans or maps of cities or districts about certain buildings are given.

The authors point out the fact that civic art can learn most from a study of the triumphs of the seventeenth and eighteenth centuries, which in turn were deeply influenced by a study of classic antiquity. They say that while the modern architect learned long ago to study even the smallest details of buildings of the classic and renaissance periods, the far more important settings of the buildings from which he takes these details have interested him but little. Would it not be fairer to say that the modern architect fully realizes the importance of these settings, but that he realizes only too well the

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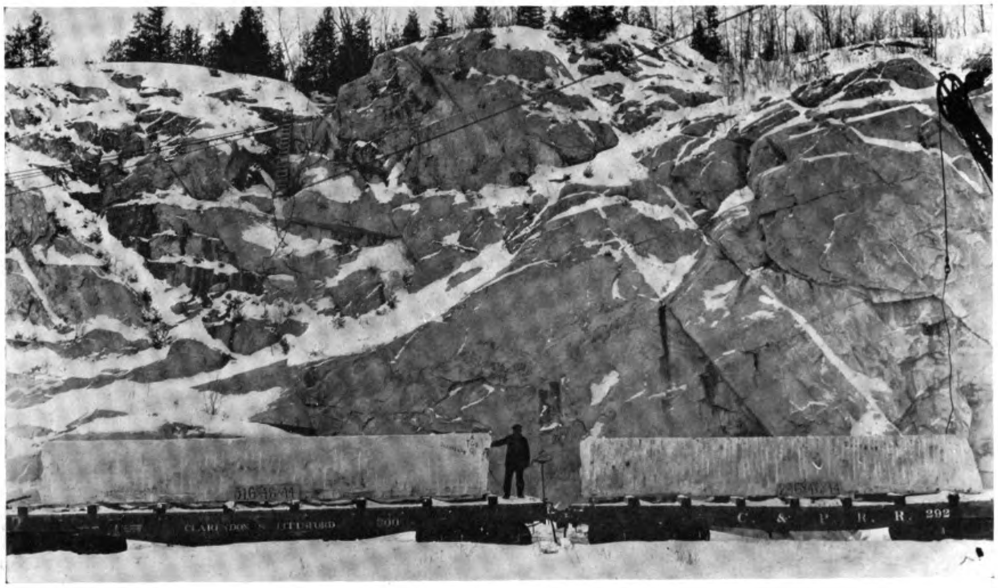
From Vermont's Banks of Marble



to the Marble Banks of Industry

IT may be said that if the designer of every bank building were given free rein, his choice invariably would be marble.

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impossibility of attaining anything even approximating their beauty under modern conditions and that he therefore concentrates his interest upon the securing of such data as he may reasonably hope to use?

Modern American architects and town planners are working under conditions far different from those which obtained when the superb squares, places and plazas of England, France or Italy were being produced. Instead of having at his back a strong, responsible national or municipal government, assured of its continued existence and willing as well as financially able to enforce the carrying out of any project which it undertook for public improvement, the modern architect must only too often cope with the difficulties presented by constantly changing administrations in the case of a government, either national or municipal, and even more frequently with the greater difficulty of there being many individual owners of property, possessed of widely different views. Even where a government is the client a committee must generally be propitiated and won over to anything which departs from the conventional, and even then there are almost always difficulties of a financial nature to be solved, for in America architects have not such advantages as were possessed by the architects of Europe—say of France during the reign of Louis XIV—when they were able to draw lavishly upon national or city treasuries, replenished by levying additional taxes when further financial resources were required. Where all these difficulties have been overcome there have resulted in America many noble examples of state or municipal architecture, such as state capitols or universities, city libraries, civic centers or hospital groups, illustrations of many being contained in this extremely well illustrated volume.

While emphasizing, perhaps, the importance of city planning and giving countless illustrations and plans of successful work of this valuable nature, the broad scope of this volume makes possible its consideration of such minor problems as are found in the planning of residence groups, sometimes in cities but more frequently in suburban districts where space exists for adequate development. Recognition is also given to many instances where the planning of small towns or villages has been successfully accomplished, a notable example being Yorkship Village, where again success was possible only because behind the plan there was but a single ownership to prevent the town's developing into the usual chaos.

The authors of this volume see in the planning of American collegiate groups a most hopeful outlook for architectural planning upon a considerable scale, and they review the planning and building at Columbia, Sweet Briar College, Johns Hopkins and the University of California and the restorations at the University of Virginia, together with certain of the newer dormitories at Harvard as indications of undoubted growth of good taste and appreciation of collegiate work. The tall building which is now recognized as a necessary part of modern architecture, and which is sometimes regarded as being a menace to the development of an American city, is regarded by the authors as possessing possibilities in the beautifying of a city which are not often recognized, particularly when the environment of such a building permits its being tied in or united to its surroundings instead of making it a discordant element as it only too often is.

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HOW FRANCE BUILT HER CATHEDRALS. **By Elizabeth Boyle O'Reilly, Honorary Member of the *Société Française d'Archéologie.* 612 pp., 6 x 9 ins. Price $6. Harper and Brothers, New York.**

GENERATIONS of enthusiastic admirers of the Gothic architecture of France have left tangible proof of their enthusiasm in the vast number of volumes in which are recorded for posterity the results of their patient historical inquiry or archæological research;—few of the admirers of these architectural splendors of a vanished age have been chiefly concerned with what might perhaps be called the "human background" against which they were reared.

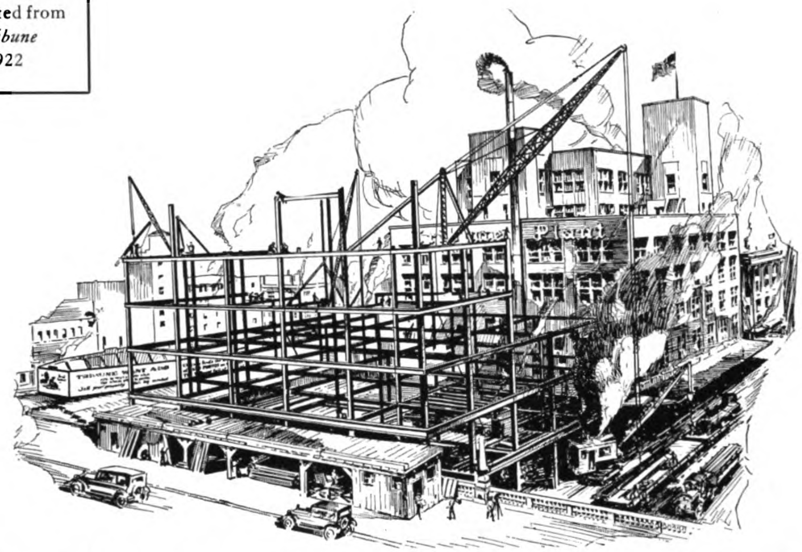
The present volume is the matured and well-considered result of many years of travel and careful study upon the part of a writer who possesses the rare faculty of helping her readers to actually visualize what is being read upon the printed page, and is concerned perhaps with the history of the times which produced the Gothic of France almost as much as with its actual design and construction. The author weaves a marvelous narrative of those centuries when popular enthusiasm and religious fervor covered France with the rich flowering of Gothic art in the form of cathedrals and abbeys—literally *Gesta Dei per Francos.* Here is explained the very meaning of Gothic architecture—not so much a form of design, in which considerable use is made of pointed arches, as an ingenious system of construction which involves careful handling of thrust, counterthrust and balance, and the author traces the progress of Gothic from its foundation upon the earlier Romanesque, through stages of experiment until it culminated in the fragile and nervously graceful masonry of Amiens, soaring toward heaven and constituting a lace-like frame for the triumphs of glass, an art which was brought to a rich fruition during those same centuries. Few writers have so well related the progress of architectural development and so vividly portrayed the glories of that privileged corner of a highly favored land, the "Ile-de-France," a name by which old geographers designated the area enclosed by the Seine, the Oise, the Marne and the Aisne, where arose the most brilliant of Gothic achievements.

Because of its historical importance, added to the care with which architectural obscurities have been cleared up, this work will prove to be an invaluable addition to an architect's library, supplying as it does data which will probably not be found in other books of a more strictly architectural nature. The entire work is splendidly documented and the unusually complete index has been prepared with the care which has been given to every other detail of this fascinating book. Much of its interest is due to the spirited illustrations from drawings by A. Paul de Leslie.

SPANISH INTERIORS AND FURNITURE. Part II. By Arthur Byne and Mildred Stapley. A portfolio of views of Spanish interiors and details of furniture. 50 plates. 10¾ x 13¾ ins. Price $10. William Helburn, Inc., New York.

THE second part of this valuable work, which is to include four sections, is a mine of rich suggestion to architects and interior decorators who have discovered the possibilities which lie in the use of the Spanish types of interior architecture, furnishing and decoration. As with the interiors of Italian homes, the domestic interiors of Spain emphasize the difference which is obtained by contrast—the use of a plain, unadorned

This page is reprinted from *The Chicago Tribune* of June 10, 1922



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material as a foil to another of extreme richness, and these plates abound in illustrations which show the use of richly carved wood, polychrome tiles and pottery or sumptuously worked metal, which are given the desired degree of decorative emphasis by being used in connection with rough plaster or with wood which has been merely oiled.

It may be its simplicity of construction as well as of decoration which lends to Spanish furniture a particular interest to craftsmen and wood carvers, and to reproduce many of these quaint and decorative old benches, chairs, tables and other objects could hardly be beyond the power of many craftsmen of ordinary skill. Possibly with this in mind the authors of this work have included working drawings of a number of pieces and many designs of rosettes and panels, as well as of other details such as the arm ends of chairs in simple carving, which of course add greatly to the practical value of the portfolio. Craftsmen whose skill leads them to attempting more exacting work will find interest in a number of drawings of larger pieces, such as cupboards, in which considerable use is made of boldly carved panels and drawer fronts, or of walnut spindles with turning which is characteristically Spanish.

This portfolio, like Part I of this work, contains countless illustrations which suggest the aid to interior architecture which is given by such decorative accessories as tiles, various forms of pottery, fabrics, ironwork and other objects for the production of which Spanish craftsmanship has long been renowned. An important part of any Spanish home is its courtyard or patio, and since such semi out-of-door spaces are frequently included, under one name or another, in American homes the Spanish treatment which is illustrated in a number of these plates constitutes still another element of value to the work.

THE PRINCIPLES OF INTERIOR DECORATION. By Bernard C. Jakway. 289 pp., 5½ x 8¼ ins. Price $2.50. The Macmillan Company, New York.

THE general recognition which is now accorded interior decoration as a logical part of the practice of an architect, particularly of an architect whose activities include the designing of residences and apartment houses, gives to the subject of adequate training in the principles of interior decoration an importance which is highly practical. Contrary to the belief held by many, skill in the art of interior decorating does not come by intuition but is the result of knowledge which must be acquired, and while the grasping of its underlying principles is no doubt aided by the possession of natural good taste, really successful work in this field presupposes considerable training, which must be supplemented by actual experience and practice. The art of interior decoration has suffered in the past—and is suffering today—because so many individuals have undertaken such work without either the training or the experience which would justify their calling themselves interior decorators.

The present volume is a notable addition to the rather small number of books which actually contribute to the working knowledge of those who would seriously study the subject. While in no sense an elementary work, it begins with the fundamentals of interior decorating and discusses the various subdivisions of the subject in the clearest terms possible, the points involved being emphasized by drawings in many instances and in numerous cases by illustrations of actual rooms. In 17 chapters the work covers the different aspects of the subject, some of the chapter headings taken at random being: Fitness to Purpose; The Grammar of Decoration; Line and Form; The Law of Contrast, and Color Harmony. An especially valuable chapter is that entitled "Proportion," in which considerable attention is given to the discussion of scale. A really excellent book, which should be brought to the attention of anyone interested in the study of the somewhat broad subject of interior decoration and which would be of much practical value to most architects as well.

LA CITE-JARDIN. By Georges Benoit-Lévy. 290 pp., 6¾ x 8¾ ins. Editions des Cités-Jardins de France, 167 Rue Montmartre, Paris.

THIS work is one of a number by the same author on various aspects of the "garden city" movement and is concerned largely with an explanation of the garden city and an exposition of the principles which underlie the building and administration of one or two of the chief English settlements of this kind. The author considers the subject in close detail, and the volume gives an excellent idea of the villages themselves and of the life which goes on within them, and his text is illustrated with quite a number of halftones which show the tastefully designed and well placed structures of various kinds which the English architects so well understand designing for these garden city settlements.

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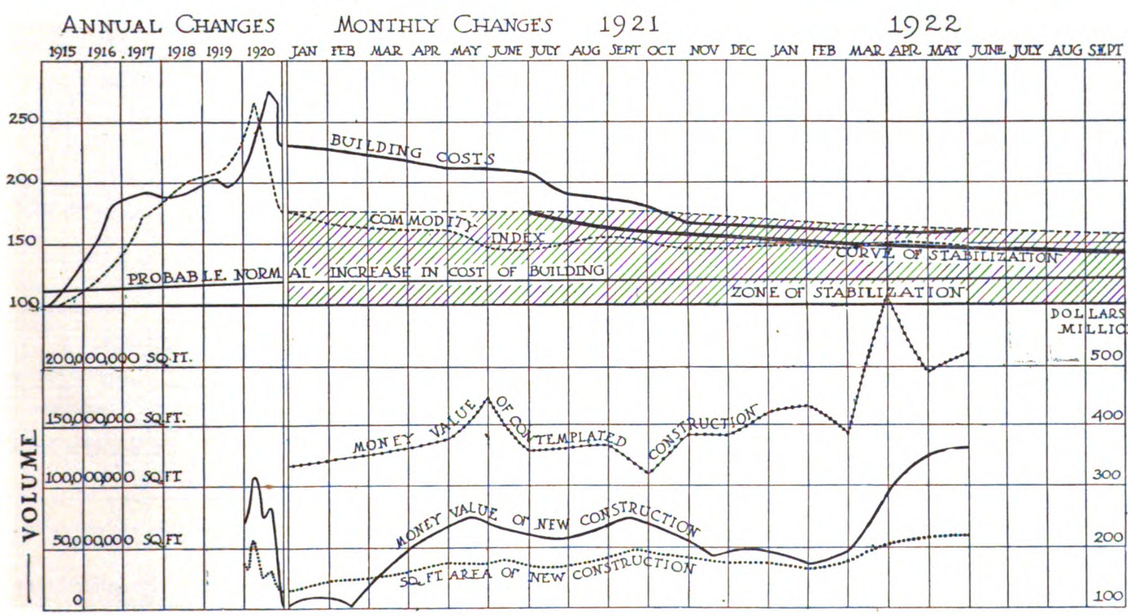
The Building Situation

THE reaction of the large number of building permits filed in March (as shown in the chart below as "Money Value of Contemplated Construction") is indicated by the rapid rise of the trend lines showing volume and value of new building construction during April. The month of May shows this large volume maintaining its strength, and while it may be expected that there will be a seasonal decrease in the summer, it is quite certain that the lines indicating volume and value of building will maintain a considerably higher level than during 1921.

An interesting fact shown by an examination of the trend lines on the lower part of the chart is that we have passed the first wave of building activity, in 1921, which was to a great extent of speculative character. We have now entered the second wave of activity, characterized by a better type of building in which architectural design receives far greater consideration. It will be noted that in the months of March, April and May of 1921 there was a considerable rise in the lines indicating building volume and value, but it will also be remembered that architects did not greatly benefit at that time. During the period of the upward swing of the same lines in April and May of 1922 architects have benefited directly because of the better types of construction involved in this second wave of activity.

There has been a slight upward trend in the index of building cost. This is one of a number of slight increases which we have predicted as resulting from a sudden demand for materials and labor at a time when material stocks were low. It is interesting to note, however, that production is increasing and that a large proportion of the building material plants are working full time, and in many cases over-time, in order to meet the demand. It is not anticipated that cost increases will be great.

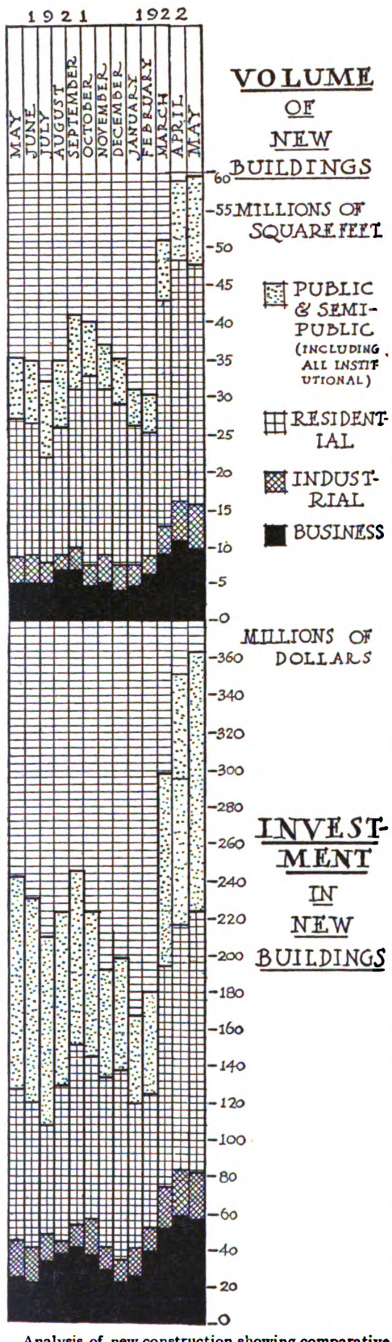


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

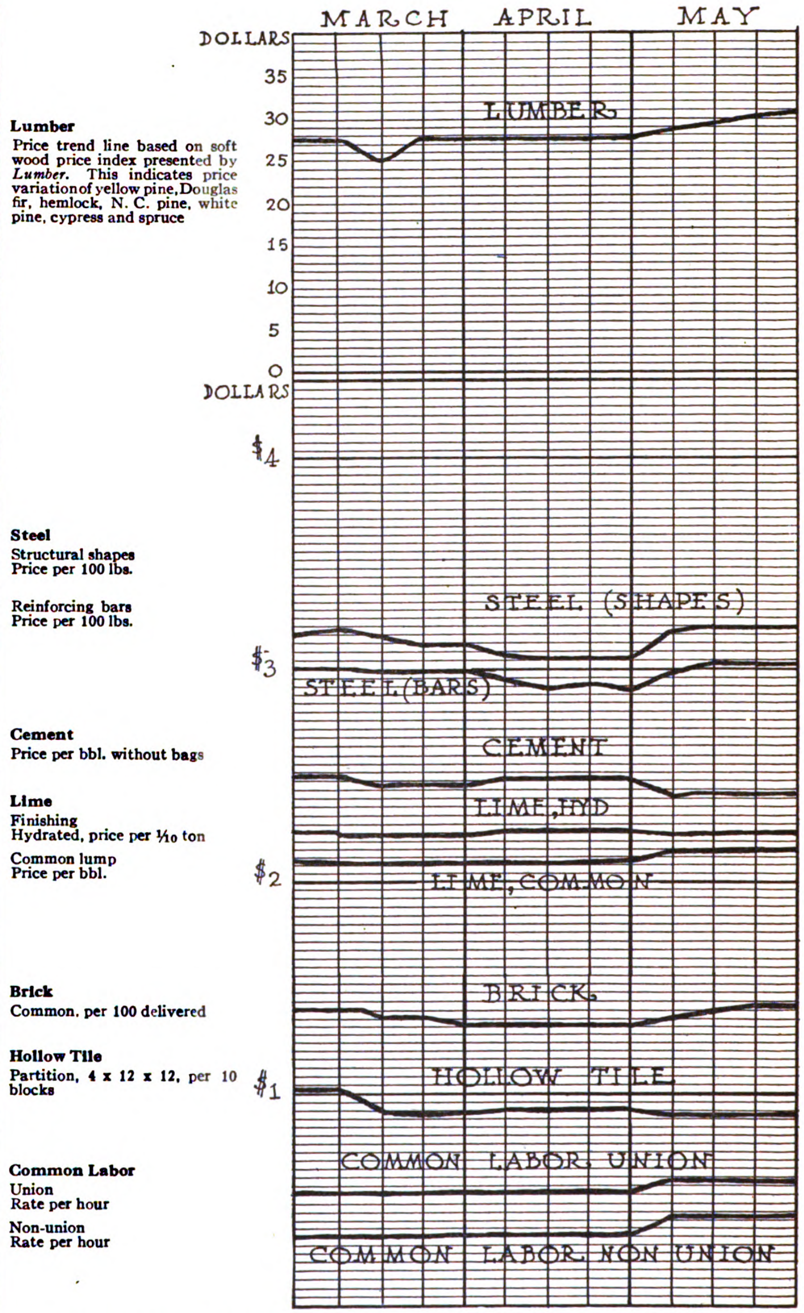
The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line shown on the preceding page.

The material market during May and June has shown an increase in certain basic materials such as steel, lumber and common brick. At certain points in the country the increase in the cost of brick has been particularly noticeable, in New York, for instance, where it was found difficult to get brick at any price. To these increases may be added some increase in labor cost owing to increased demand and the payment of premiums to good mechanics. Some of these increases have resulted in a reaction which is shown upon the chart on the preceding page where it will be noticed that the index of the cost of building has gone up about two points.

Whenever there is exerted a sudden pressure of demand, particularly when it has not been thoroughly anticipated by manufacturers, it is to be expected that there will be some increase in cost. It is usually true, however, that this is but a temporary condition and will not affect the gradual downward trend of material prices.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of May 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitchburg	Mass. Haverhill	N.Y. Buffalo	Penn. Pittsburgh	Penn. Erie	Md. Baltimore	W. Va. Fairmont	S. C. Columbia	Ga. Savannah	Michigan Detroit	Michigan Pontiac	Michigan Saginaw	Wis. Milwaukee	Minn. Duluth	Iowa Cedar Rapids	Iowa Waterloo	Iowa Council Bluffs	Ill. Chicago
Common Brick		1,000	*$21.00	$20.00	$17.12	$16.00	$15.75	*$17.00	$21.00	$10.50	$13.50	$16.00	$14.40	$12.00	*$12.00	$14.50	$14.30	$14.90	$17.50	$11.00
Portland Cement	Excl. of containers	Bbl.	*2.65	2.85	2.36	2.40	3.00	2.31	2.30	2.90	3.00	2.85	2.29	2.11	*2.40	2.40	2.21	2.33	2.32	1.87
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	*62.00	.....	.....	47.00	.....	.....	35.00	.....	25.00	40.50	36.00	45.00	.....	.....	41.00	42.00	40.50	37.00
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	40.50	.....	47.00	*37.00	35.00	41.00	42.00	39.50	.....
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	44.00	.....	.....	.....	32.50	.....	17.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	*40.00	36.00	29.50	45.00	.....	35.00	37.00	30.00	.....	.....	40.00	37.50	*32.00	35.00	35.00	36.00	38.00	31.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	.....	.....	.....	72.00	.....	50.00	68.00	50.00	50.00	70.00	.....	.....	.....	85.00	87.00	96.00	100.00	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.00	.....	.....	.....	75.00	92.00	96.00	90.00	.....
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	*5.50	6.00	5.70	4.68	5.50	.....	5.00	5.75	.....	5.40	5.75	5.00	.....	5.50	6.25	7.00	6.50	.....
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	7.00	.....	.....	5.00	.....	.....	.....	.....	*6.00	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	6.00	.....	7.25	7.00	5.80	*7.00	6.50	6.50	5.22	5.70	6.50	*7.00	6.00	5.75	8.00	8.25	.....
Gypsum Plaster Board	⅜"	1,000 sq. ft.	*40.00	44.00	45.00	37.50	50.00	35.00	25.15	32.00	37.50	30.00	23.93	32.00	*38.00	43.00	40.00	25.00	.....	.....
Lime	Hyd. Com.	Ton	*20.00	19.00	18.00	20.00	19.00	13.50	13.10	19.00	22.20	15.20	13.70	15.00	*20.00	.....	15.40	20.00	17.85	14.70
Building Sand		Cu. yd.	*2.00	2.25	1.28	3.37	2.50	1.75	3.25	.95	2.00	2.61	1.50	2.25	*3.00	1.25	1.05	1.50	2.43	2.25
Crushed Stone	¾"	Cu. yd.	*3.70	3.00	1.62	6.87	3.00	2.75	4.50	3.00	5.10	3.00	1.48	3.00	*2.75	2.60	2.03	3.00	3.60	2.25
Window Glass	Single A 10"x12"	50 sq. ft.	*4.50	3.75	3.90	2.80	.....	4.50	4.20	4.00	.....	3.60	.....	5.40	.....	5.00	.....	7.00	.....	.....
Hollow Tile	8"x12"x12"	Each	*.20	.24	.19	.19	.18	.19	.14	.14	.....	.19	.17	.15	*.15	.....	.12	.12	.....	.....
Cast Iron Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	58.80	51.74	.....	48.00	45.00	.....	.....	53.00	52.00	45.00	.....	50.40	53.90	45.00	.....	.....
Steel Pipe	1" galv.	100 ft.	.....	.....	10.00	7.82	.....	7.56	7.75	9.00	.....	8.75	8.50	8.75	.....	9.30	9.61	9.50	.....	.....
Reinforcement Bars	¾" square	100 lbs.	.....	3.50	.....	2.37	.....	.....	.....	.....	3.00	2.60	2.40	2.85	*2.50	.....	2.75	.....	3.05	.....
Structural Steel	Fab. 6" I-beams	100 lbs.	*3.25	4.00	*3.05	.....	.....	.....	3.25	3.00	3.00	3.50	.....	3.00	.....	3.25	4.00	3.20	3.45	.....
Gypsum Plaster	Neat	Ton	*25.50	.....	13.50	22.00	24.00	18.00	14.00	17.50	21.50	19.00	13.90	15.00	*15.00	21.50	12.00	13.60	17.50	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	*17.00	.....	.....	13.50	.....	.....	11.50	12.00	.....	17.50	17.10	.....	.....	.....	.....	20.00	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	*3.00	2.40	2.00	1.95	2.15	.....	.....	2.15	1.90	2.75	2.75	2.75	.....	2.75	2.50	2.45	2.90	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	.....	1.50	1.05	1.35	.85	1.25	.85	1.00	.75	1.00	1.00	.....	.....	1.00	1.10	1.47	1.40	.....

*F.O.B. job

Commodity	Size or Condition	Unit	Mo. St. Louis	Mo. Kansas City	Ohio Akron	Ohio Youngstown	Ohio Dayton	Ohio Cincinnati	Ohio Toledo	Ohio Cleveland	Ariz. Tucson	Ark. Little Rock	La. Shreveport	Texas San Antonio	Texas Dallas	Wash. Spokane	Wash. Seattle	No. Dak. Grand Forks	Calif. Pasadena	Calif. San Francisco
Common Brick		1,000	*$14.00	$16.50	*$13.50	$14.55	*$16.50	*$18.00	.....	*$14.00	$10.00	$12.50	$16.00	$16.00	$11.15	$14.25	$14.00	$14.00	*$17.00	$15.50
Portland Cement	Excl. of containers	Bbl.	*2.60	2.70	*2.76	.....	*2.77	2.30	$3.08	*2.64	.....	3.80	3.60	3.00	2.80	2.90	2.95	3.00	*3.20	2.55
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	*37.00	.....	*40.00	45.00	*45.00	*38.00	43.00	*50.00	.....	.....	41.00	45.00	27.00	.....	.....	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	*39.00	43.50	.....	.....	.....	.....	.....	.....	50.00	25.00	.....	.....	.....	.....	.....	38.00	*48.00	30.00
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	*45.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	*41.00	48.00	*40.00	45.00	.....	*34.50	60.00	*58.00	50.00	35.00	46.00	48.00	32.00	.....	15.00	32.00	.....	28.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	*61.00	80.00	*70.00	85.00	.....	.....	75.00	*84.00	.....	58.00	86.00	75.00	.....	.....	.....	85.00	.....	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	64.50	.....	.....	.....	.....	.....	.....	92.50	.....	.....	.....	.....	.....	50.00	.....	*85.00	65.00
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	*5.95	5.00	*5.20	7.00	*5.50	*4.50	5.40	*5.04	6.00	4.80	7.00	7.00	4.50	.....	3.00	5.00	*5.85	4.60
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.00	8.00	.....	4.75	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	*6.00	5.80	.....	.....	*6.50	*5.75	.....	*6.25	.....	6.25	7.00	.....	.....	.....	.....	8.00	.....	9.75
Gypsum Plaster Board	⅜"	1,000 sq. ft.	*43.00	32.50	*47.50	50.00	*32.50	30.00	40.00	*54.00	55.00	35.00	45.00	52.00	35.00	.....	40.00	55.00	*50.00	.....
Lime	Hyd. Com.	Ton	.....	24.00	*17.00	14.10	*14.00	12.50	.....	*14.80	15.00	25.00	27.50	22.50	16.00	.....	24.00	28.00	*28.00	20.00
Building Sand		Cu. yd.	*2.56	2.35	*2.22	.....	*1.85	1.35	.....	*2.50	1.15	1.00	2.00	2.75	2.25	.....	1.50	3.00	*1.75	1.50
Crushed Stone	¾"	Cu. yd.	.....	3.00	*4.06	.....	.....	1.75	.....	*3.50	3.00	2.00	5.00	2.60	2.75	.....	.....	6.00	*3.00	2.50
Window Glass	Single A 10"x12"	50 sq. ft.	*3.90	4.50	.....	4.50	*4.50	.....	.....	.....	5.40	5.00	4.50	5.40	.....	4.43	.....	.....	.....	4.21
Hollow Tile	8"x12"x12"	Each	.....	.22	.14	.14	.18	.16	.....	.....	.18	.20	.25	.21	.....	.....	.....	.....	.....	.18
Cast Iron Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	*65.00	.....	.....	.....	.....	65.00	77.00	59.00	.....	60.00	60.00	.....	.....	63.84
Steel Pipe	1" galv.	100 ft.	.....	.....	*8.36	8.27	*8.57	.....	.....	.....	9.95	11.00	9.40	9.40	.....	10.26	10.00	.....	.....	9.00
Reinforcement Bars	¾" square	100 lbs.	.....	2.90	*2.75	.....	*2.50	.....	.....	.....	4.00	3.25	4.00	3.75	4.00	3.75	3.25	.....	.....	.....
Structural Steel	Fab. 6" I-beams	100 lbs.	3.35	3.75	*2.75	3.90	*3.25	.....	.....	.....	.....	3.50	4.00	.....	.....	.....	3.35	.....	.....	3.90
Gypsum Plaster	Neat	Ton	*19.50	15.50	*19.00	22.00	*19.00	.....	.....	.....	23.00	25.00	24.00	24.00	.....	.....	20.00	27.50	*21.00	14.80
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	14.00	*16.50	.....	.....	.....	.....	16.00	12.00	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	.....	3.00	.....	2.15	*2.25	.....	.....	*2.50	3.25	2.25	2.25	2.85	2.00	.....	2.60	3.25	*2.50	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	*.72	1.20	.....	.75	*1.15	.....	.....	.....	1.35	1.20	1.00	1.80	.....	1.23	.....	1.50	.....	.....

*F.O.B. job

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A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

CONSTRUCTION COST IS LIKELY TO ADVANCE

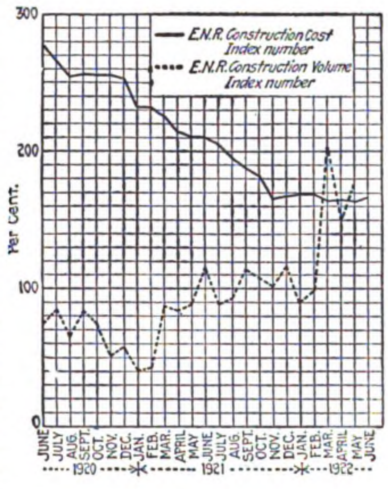
A PREDICTION of increased construction costs appears in *Engineering News-Record*. Since June, 1920, the construction cost curve has declined steadily. The heaviest drops from one month to the next were during January, 1920, and October, 1921. The latter drop—16 points or 9 per cent, according to *Engineering News-Record's* Cost Index Number—pictures the final slump of the steel market and labor deflation, and was the last important decline to be recorded. Since then cost has been about the same from month to month, even creeping up slightly.

Prices are stiffer, and there is a growing feeling that they may rise generally. Warrant for this feeling may be found in a study of the accompanying chart, in which the *Construction Cost Index* (CC) and the *Construction Volume Index* (CV) are plotted to the same scale. The CV Index shows the rate at which contracts are being awarded, compared with 1913 activity. From June, 1920, to June, 1921, the average monthly rate (70 per cent) was 30 per cent lower than in the year before the war—and 1913 itself was a subnormal construction year. On the other hand the average rate for the last twelve months has been 122 per cent, which is 22 points greater than for 1913 and 74 per cent higher than for the preceding twelve months.

Confidence began to return to the construction industry with the opening of 1921. This is clearly reflected in the jump of the CV Index from 43 to 88. By May the 100 per cent level had been reached, activity being equal to the average 1913 rate. This general level was maintained during the rest of the year. Only minor ups and downs of the curve appear during this period.

The abrupt increase in contracts let in February, 1921, followed by a continuance of this higher volume rate, began to show visible effect in November, 1921—ten months after the first impetus. Construction cost climbed slightly. It settled back during February, 1922, but the rise was resumed in March, and the advance since then has amounted to about 4½ points, or nearly 3 per cent.

It is plain that the second great impetus of the last two years—beginning with 1922—has not yet had anything like its full effect upon prices of construction materials. It is not likely that the experience of the first impetus will be repeated in the second instance, and that ten months will pass before prices react to promised increased demand. There was a reason for this ten-month period in 1921. It would have been a difficult feat to have stemmed the 1920–1921 decline in cost, even if anyone had wanted to do so. Prices had to come down, and only a practically impossible call for materials and labor could have kept them up.



Therefore, even with the increasing prospective demand for materials, prices and labor rates continued to decline until balanced by actual ordering of materials for the new construction. As stated, this steadying took place beginning November last.

The construction impetus initiated last January by the final price drop is already beginning to stiffen prices and labor rates. Steel and cement are firm. Brick, on the other hand, is jumping upward in a most unhealthy manner. Lumber is rising generally. The average rate paid common construction labor is slightly higher than a month ago.

Obviously, then, construction cost is due for an increase; how much and for how long cannot be predicted. It is easily conceivable that steel—the material hardest hit in the slide from the peak—may return to $1.75 per 100 lbs. for structural shapes. Last fall the feeling was quite general that this would have been a workable price. As there was practically no actual demand for steel at the time, the market continued to weaken until steel could be bought at $1.30. Future prices of cement depend largely upon the coal situation. Adding $2 to the price of a ton of coal at the mines increases the cost of cement 20c. per bbl. Brick prices are already out of reason, but with continued demand and insufficient production there is nothing to prevent still greater inflation.

What will be this increase in construction cost? A guess that would be as good as the next would be five per cent (an Index Number of 175).

CONTRACTORS' OPINIONS OF THE BUILDING OUTLOOK

QUESTIONNAIRES sent to representative firms in the eastern building construction industry brought answers to the Dow Service Daily Building Reports that indicate general satisfaction with the outlook for the remainder of 1922, at least.

One hundred were mailed and ninety replies were received. To the first question: "What, in your opinion, is the principal retardant to a free construction market?" eighty-five named labor as the principal cause. Three attributed it to both labor and high cost of materials, one to shortage of money for commercial building purposes and one to the uncertainty regarding the market's requirements for more building.

To the question: "Is demand below or in excess of production of building materials?" seventy-two replies were to the effect that production is trying to keep pace with demand, which was too spotty under present conditions of the market to warrant general free full capacity production. Nine replied to the effect that the only reason production was not now exceeding demand was because the fuel shortage prevented full capacity production. Three charged that production was being held back to keep prices high in the face of growing demand. Six, on the other hand, believed that there is going to be a reaction in demand, due to advancing prices of commodities resulting in over-production, hence lower prices, and that, therefore, demand would soon fall below present rate of production.

Scarcity of Skilled Labor

The third question: "Do you look for labor liquidation before 1923?" brought an almost unanimous negative reply. Fifty-five replies indicated a belief in a continued scarcity of skilled labor for building construction work this year, but with wage reductions next year. Thirteen looked for continuous shortage of labor and consequent high wages until the ban on immigration is lifted. Eleven expressed the belief that the "snowballing" tactics of certain kinds of building labor was checking building construction progress and would effec-

tually blight it for next year. Three looked for a sharp reduction in wages of general building trades labor this year, two looked for higher wages in 1923 and six expected long labor strikes and lockouts before wages would be permanently lowered to the 1913 scale.

Were it not for the coal shortage there is no doubt that the replies to question No. 4 as to what the industry expected of building material prices would have emphatically prophesied lower prices, because eighty-eight of the ninety replies received were qualified by the remark to the effect that the fuel shortage would have an influence in keeping prices high in 1922. The other two (from brick manufacturers) looked for a lowering of prices before the end of the year.

Registered demand, now fairly measurable for the remainder of 1922, is sufficient to prevent a general building material price slump before the opening of the 1923 building season, according to the bulk of the replies received. Some believed, however, that the peak of building material price ascension had been reached for this year, barring further fuel complications.

Replies to the question as to whether labor was at the present time freely available or scarce brought replies from twenty-nine that available labor was either inefficient or practically out of the market; sixty-one reported plenty of labor. The greatest scarcity is apparently experienced among bricklayers, tile layers, plasterers and in some of the metal trades.

RISING CONSTRUCTION COSTS PREDICTED FOR NEXT SIX MONTHS

MILAN V. AYRES, Statistician of the Associated General Contractors of America in an article appearing in *The American Contractor*, June 3, advises contractors that this is not a time to make low bids. His comments are:

The general level of prices has been going up now for the past two or three months. All authorities agree that the business depression has reached the bottom, and we are now on the up-grade. There is practically no exception to the rule that prices generally increase somewhat during the period following a depression, when business is recovering. We believe that this is now occurring and will continue probably for at least six months to come. The long time tendency of prices will probably be downward, but for some time they are going up.

Wages in many lines have been reduced rather severely during the past few months. Unquestionably, in some places and in some industries, where wages are still at the peak, reductions will be made, but a time of improving business is not a time when wages generally can be reduced. Immigration has been restricted in such fashion as to greatly reduce what has in past years been the principal source of recruits for the ranks of common labor.

Business is improving and freight rates are staying up. The railroads have made only a beginning toward a recovery from a desperate financial plight and they will not willingly submit to drastic reductions.

WHO GETS THE BUILDING MONEY

ONE and one-half billions of dollars were spent in building operations authorized by permits issued in 207 cities of this country in 1920. According to the best available estimates about 44 per cent of this sum, or 660 millions of dollars were paid for materials, slightly less than this, or 657 millions of dollars went as wages to labor, while about 12.2 per cent, or 183 million dollars account for all overhead charges including contractors' profits.

The table herewith shows this distribution in detail. The figures are not presented as embodying a high degree of accuracy. They are based upon data given in three previous INDEX reports, issued on April 8, 1922, February 18, 1922, and October 24, 1921. These show the cost of buildings authorized by the 1920 permits of 207 cities, by classes of construction, the distribution of labor costs among the building trades in wood and brick construction, and the distribution of total building costs among material, labor and overhead. In combining these data certain assumptions had to be made which necessarily makes the final results only approximate.

It is believed, however, the diagram gives a fairly accurate view of how this money was actually expended. It is safe to conclude that a decrease in material costs would have the greatest effect in lowering cost of building, that carpenters' wages are reflected in building costs much more than those of any other class of labor, and that contractors' profits do not constitute an inordinate portion of the total costs.

	Millions of Dollars	Per Cent of Total
MATERIAL	660	44.0
LABOR		
Carpenters	243	16.2
Bricklayers	114	7.6
Common labor	58	3.9
Plasterers	56	3.7
Plumbers	52	3.5
Painters	48	3.2
Hod Carriers	36	2.4
Electricians	17	1.1
All others	33	2.2
OVERHEAD and PROFIT		
Overhead	81	5.4
Compensation of subcontractors	54	3.6
Compensation of general contractors	48	3.2
	1500	100.0

ALLOCATION OF BUILDING COSTS

Approximate distribution of one and one-half billion dollars expended under building permits issued in 1920 in 207 cities.

BUILDING TRADES LABOR SHOWS GAINS IN SOME CITIES AND NO DECREASES

STATISTICS on building trades wages compiled to June 1 are presented in *Engineering News-Record* from which the accompanying table is reprinted. Steady and sustained gains in employment throughout the United States are shown in reports of the President's Conference on Unemployment. For every 100 jobs listed during April there were 150 applicants as against 182 in March, 205 in February and 226 in January. This represents a decrease of 33 per cent in the number of applicants for employment during the first four months of the year. Unemployment has decreased about 61 per cent since May 1, 1921, according to the National Industrial Conference Board.

Actual increases in rates are making their appearance in building trades wage schedules, due no doubt to increasing

(Higher rates indicated by +, decreases by −)

Cities	Bricklayers	Carpenters	Hoisting Engineers	Hod Carriers	Structural Iron Workers	Common Labor
Atlanta	$0.90	$0.70	$0.70	$0.30	$0.65	$0.20
Baltimore	1.25	.80	.87	.54	1.00	.30
Birmingham	1.00	.75	.50@1.00	.15@.25	1.00	.15@.20
Boston	.90	.90	.90	.60	.90	.55
Chicago	1.10	1.00	1.10	....	1.05	.72½
Cincinnati	1.25	.95	.95	.72½	.95	.40
Cleveland	+1.25	+1.04@1.10	1.04	.60	+1.10	.57½
Dallas	1.00	1.00	1.00	.60	1.00	.25
Denver	1.25	1.00	1.00	.75@.81¼	1.03⅛	.35@.50
Detroit	+1.12½	.80	.80@.90	.50@.60	.60@.80	.50
Kansas City	1.07½	1.00	1.00	.80	1.07½	....
Los Angeles	1.25	1.00	1.00	1.12½	1.00	.56¼@.62½
Minneapolis	1.00	.80	.80	.65	.80	−.35@.50
Montreal	.80	.60	.50	.35	.55	.20@.30
New Orleans	1.00	.88	.90	.40	1.00	.30
New York	1.25	1.12½	1.25	.87½	1.12½	−.44@.60
Pittsburgh	1.30	1.12½	1.00	.80	1.00	.35@.60
St. Louis	1.25	1.12½	1.12½	.85	1.05	.35@.40
San Francisco	1.12½	1.00	1.00	.75	1.12½	.47½@.50
Seattle	1.00	.80	.90	.70	.80@.90	.50@.60
Philadelphia	1.00	.90	.90	.75@.90	.90	.25@.35

shortage of skilled mechanics. For example, carpenters in Pittsburgh and bricklayers in Detroit have been granted an increase of 12½c. per hr., effective June 1. No wage decreases for skilled labor are noted in twenty-one cities reporting to *Engineering News-Record*, though slight reductions and adjustments are reported for common labor in New York and Minneapolis.

With the 1921 wage scale still in effect in New York City and premium wages being offered many of the skilled building trades, the unskilled rates seem to range between 44c. and 60c. per hr., which is considerably below the 1921 schedule. This is plainly an instance of cutting under the established rate for union common labor and applies to conditions such as those existing in reinforced concrete construction.

FIVE-YEAR RISE AND FALL IN HOTEL OPERATING COSTS

An interesting tabulation of hotel room operating costs was recently published in *The Stevens Monthly*. This should be of interest to architects who design hotels as it gives various details of hotel operating costs, together with a value comparison of the fluctuation of such costs during the last five years.

Although the United States entered the European War in April, 1917, it was not until a year later that the increased cost of labor and supplies seriously affected the operating cost of hotel rooms. Hotel operating costs increased very rapidly during the year 1919, reached their peak in 1920 and declined somewhat in 1921, and many of the items are nearly back to normal at the present time. The accompanying table shows detailed operating expenses of one hotel for the past five years, and for the first three months of this year. This hotel, operating in one of the larger American cities, under normal conditions is believed to be a fair example of the average, modern, fireproof hotel, every room with bath.

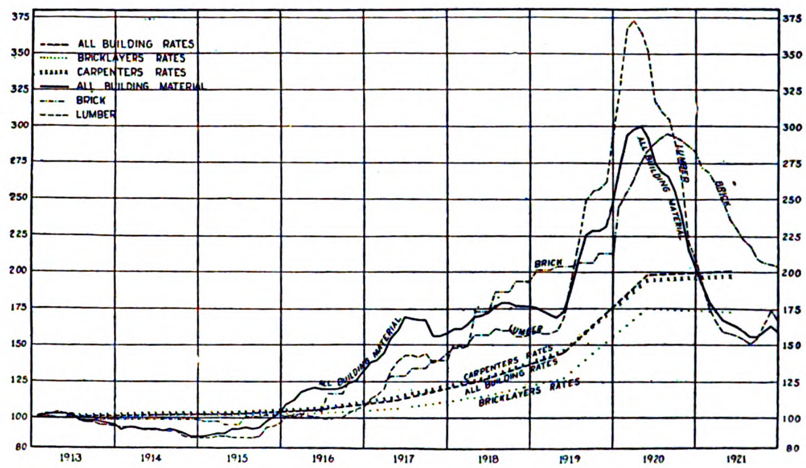
It can be seen, by referring to the table, that the hotel is now paying a rental twenty per cent (20%) higher than it did in 1917, yet the actual rental paid to the landlord is exactly the same as it was then, the higher rental shown at the present time being chargeable almost entirely to increased taxes. As most hotels are rented on a basis of a fixed sum, plus taxes and insurance, it can be seen that the rental chargeable against hotel rooms is bound to show a material increase over pre-war rentals as long as taxes remain high, and nobody hopes for any material reduction in taxes in the near future. As a matter of fact, in many cities the tax rate for the year 1922 will be the highest ever known.

Light, heat and power can hardly return to pre-war prices until coal is reduced to a pre-war price and that is out of the question as long as freight rates are as high as they are, and the cost of coal in most cities is very largely a question of freight. In the table attached, the item for heat for the first three months in 1922 is unusually high, because the

(*Continued on page 64*)

REFERENCE DATA ON BUILDING COSTS SINCE 1913

In the course of discussion with clients, architects often find reason to refer to the cost of building materials and labor at various periods since 1913. In estimating costs it is also of value to have market data which may be applied for purposes of comparison to the known cost of any building built since 1913. The following tabulation and chart presents in an interesting manner the trends of building material costs and labor costs since 1913. It was prepared by the Bureau of Labor statistics of the U. S. Department of Labor.



ANNUAL INDEX NUMBERS OF BUILDING MATERIAL PRICES AND OF UNION WAGE RATES PER HOUR IN MAY, 1913, TO 1921

Building Material, Average 1913 = 100
Union Wage Rates, May, 1913 = 100

Year	All Building Materials	Lumber	Brick Common	All Building Trades Combined (May)	Bricklayers (May)	Carpenters (May)
1913						
Lowest	96	95	99			
Highest	103	104	101			
Average	100	100	100	100	100	100
1914						
Lowest	88	87	99			
Highest	94	94	99			
Average	92	92	99	102	102	102
1915						
Lowest	88	87	96			
Highest	104	97	102			
Average	94	89	99	103	103	103
1916						
Lowest	110	99	101			
Highest	132	108	125			
Average	120	102	108	106	104	106
1917						
Lowest	138	113	125			
Highest	169	144	139			
Average	157	135	132	113	107	115
1918						
Lowest	161	148	149			
Highest	179	161	194			
Average	172	155	176	126	115	126
1919						
Lowest	169	158	202			
Highest	248	292	213			
Average	201	210	206	145	128	146
1920						
Lowest	204	209	245			
Highest	300	373	295			
Average	264	307	279	198	175	195
1921						
Lowest	156	151	204			
Highest	192	194	272			
Average	165	163	232	201	173	198
1922						
January	157	166	204			
February	156	165	202			
March	155	164	200			

heat is bought from an outside plant, and is metered into the building, and, consequently, the rate would be high for the winter months and low for the summer months, but the average for the entire year of 1922 should not exceed that of the previous year.

No depreciation is shown in the unit cost for the first three months of 1922, for the reason that this hotel has charged off nearly its entire equipment during the first five years. Therefore, it is not setting up a depreciation charge this year.

It will be noticed that there is no charge, either in 1921 or 1922, for feeding employes, for the reason that in this hotel none of the employes outside of the restaurant and kitchen help is given any meals or any allowances other than his salary.

Maintenance in a hotel is a variable item and the charge in any one year depends very largely upon how much the operator feels like spending for the year in renewing his house. In the years immediately following the war, maintenance was very expensive, due to high prices of both material and labor and any operator that expended an appreciable amount for maintenance in the years 1919 and 1920 materially increased his room operating expenses. It can be seen by referring to the table, that for the hotel in question the reduction in room costs for 1921 over the year 1920 is almost entirely accounted for in the saving of payroll and maintenance expenses. Likewise the lower expenses so far in 1922 over the year 1921 are almost entirely accounted for by the further saving in payroll and the omission of depreciation charge.

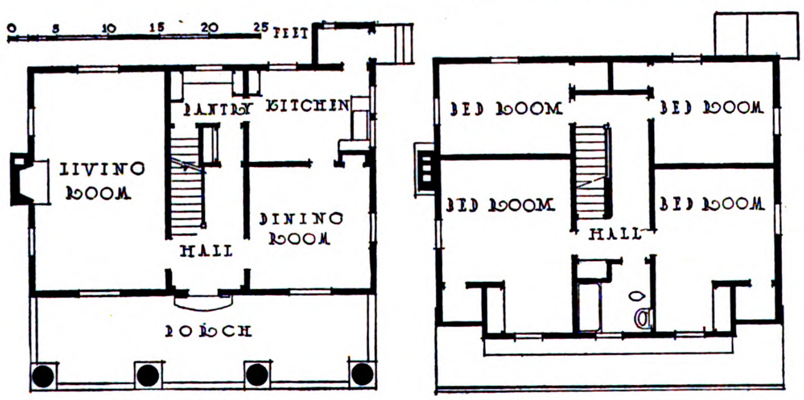
It is not probable that this hotel can operate these rooms in the future at a much lower rate than it is doing at the present time. In other words, without allowing anything for depreciation or vacancies, this hotel must assume a room operating expense of approximately two dollars per day. If this hotel had a minimum rate of two dollars and fifty cents per day for a room with bath, and could average only 80 per cent full, it would just break even on its rooms at two dollars and fifty cents per day, and must depend for its profit on the rooms renting for more than two dollars and fifty cents per day, and the problem that this hotel operator faces if he would make any money, is to rent all his rooms at an average price considerably above two dollars and fifty cents per day to keep all of his rooms more than 80 per cent full throughout the year.

HOTEL HARDING
(Name is fictitious)

	1917	1918	1919	1920	1921	First 3 Months 1922
Payroll	.200	.194	.239	.358	.349	.278
Rent	.670	.697	.760	.810	.806	.809
Light and Power	.018	.022	.019	.027	.027	.040
Heat	.033	.026	.027	.039	.050	.114
Hot and Cold Water	.041	.043	.040	.051	.065	.044
Printing and Stationery	.014	.009	.015	.020	.015	.006
Laundry	.088	.102	.183	.078	.065	.060
Advertising	.036	.030	.033	.029	.019	.007
Telephones	.014	.014	.014	.015	.014	.014
Maintenance	.101	.174	.354	.465	.260	.253
Depreciation	.170	.163	.164	.117	.107	....
Linen Renewals	.060	.024	.037	.048	.028	....
Miscellaneous	.015	.004	.004	.002	.001	.063
Feeding Employes	.016	.020	.036	.014	....	....
Administration	.194	.164	.207	.234	.160	.219
Housekeeping	.216	.243	.266	.329	.232	.127
	1.886	1.929	2.398	2.636	2.198	2.034

COMPARISON OF DETAILED OPERATING COSTS, SINCE 1917, OF A HOTEL ROOM WITH BATH

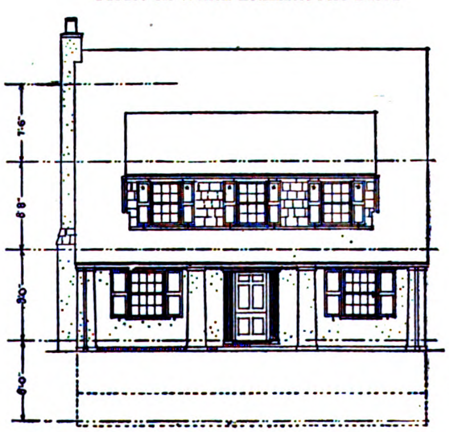
Estimates on Typical Small House Show Increases



Floor Plans and Elevation of Typical House on Which Estimates Are Based

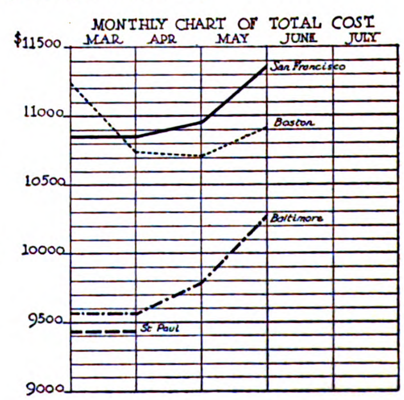
WE have submitted working drawings of this house, together with a quantity survey of materials, to a representative contractor in each of the cities named, and have secured bona fide estimates which are tabulated below. Specifications are in accord with good practice in the several localities as found in houses of this size built under the supervision of architects. The figures are for the cost complete, including contractor's overhead and 10 per cent profit, but excluding architect's fee.

The cubage of the building is figured from the first floor area exclusive of porches and a height measured from 6 ins. below cellar floor to half point of gable, to which is added cubage of kitchen entry and half the cubage of porch, taking height from footings to plate of dormer.



COST OF HOUSE (Cubage, 27,150 ft.)

	Apr.	May	June
Baltimore	9569.21	9785.21	10272.50
Cu. Ft.	.352	.36	.378
Boston	10729.65	10712.64	10906.50
Cu. Ft.	.395	.394	.401
San Francisco	10849.63	10949.63	11347.00
Cu. Ft.	.399	.406	.417
St. Paul	9430.00		
Cu. Ft.	.347		



BOOK DEPARTMENT

SCHOOL ARCHITECTURE; PRINCIPLES AND PRACTICES. By John J. Donovan and others. 724 pp., 9 x 12 ins. Price $20. The Macmillan Co., New York.

NO change in the institutions of modern life has been more complete than that which during the past few years has been wrought in educational methods. Alterations in the school curriculum and the addition of studies not dreamed of in the days when the education of young Americans was conducted in the "little red schoolhouse" have been followed by other changes even more sweeping which, particularly in some parts of the west, involve much of what is generally called "community work." All this development in the scope of the school has logically had its due effect upon the planning of the building itself to fit it for fulfilling its present-day function. New and constantly advancing ideals have led to the publication of a number of excellent works upon the modern school building, its design, plan, construction and administration, but there has long existed the need of a work sufficiently broad in scope to sum up and properly present the modern schoolhouse, ideal as to plan and equipment and complete and efficient in the correlation of its activities. This need has at last been filled, and the present volume is the result.

Taunton High School, Taunton, Mass.
Kilham, Hopkins & Greeley, Architects
Illustration from "School Architecture"

It would be difficult indeed to imagine anything more complete than the review of the modern educational plant which Mr. Donovan has provided in these well filled pages. In his 28 chapters he discusses schools of various types—the public school in its different grades, the parochial school and such other schools as those devoted to trade, vocational and other forms of educational work. He covers every detail of the school from "Sites and Grounds," in Chapter I, through other chapters which deal with the school's architecture, planning, construction, cost and the necessary landscape work to sections which are concerned with the school's equipment, organization and administration, school hygiene and physical education; then to special chapters wherein are discussed the kindergarten, the school library, assembly hall and departments of music, physics and chemistry. Later chapters deal with departments of drawing and industrial arts, domestic science department and the school cafeteria. Many of these chapters have been prepared by specialists well qualified to discuss them. As illustrations for this valuable work the author presents the best examples of schools of every type, taken from every section of the country, and the most successful work of many well known architects appears in views of exteriors and interiors, in plans and details. The work of the modern school by no means ends with the work of the classroom or the laboratory; there are still the out-of-door activities to be reckoned with and provided for, and the success of many a school depends in large measure upon the skill with which these departments have been arranged.

War conditions during the past few years have necessitated the curtailment or even the complete abandonment of school building all over the country, but the

Any book reviewed may be obtained at published price from THE ARCHITECTURAL FORUM

time has now come when projects long dormant are being revived, and other projects will be undertaken as a result of the pressing demand for more and better school accommodations. These new school buildings must be of a high order if they are to equal the expectations of the taxpayers who make them possible, and to architects everywhere who are interested in school planning and who would make their schools as efficient and satisfying as their clients have every right to expect we would commend a careful study of this complete and authoritative work upon the subject.

GOOD HOUSES. By Russell F. Whitehead. 63 pp., 8 x 11 ins. Weyerhaeuser Forest Products, St. Paul.

STUDY of American domestic architecture is to a great extent a study of structures built of wood. Of the styles employed many had been traditionally developed in materials such as stone or brick, but the American builders seized upon the fundamentals of the types and adapted them to the use of frame, and the success of their work is illustrated in countless examples which still exist. These styles not only express American ideals but, as a practical matter, are easy styles in which to design. Their forms are simple and are well suited to methods of construction in use a century ago and in use today. These styles, moreover, are ingrained is us, among all ranks, as thoroughly as any part of American culture, and it is absurd to suppose that 50 years of Victorian ugliness could have broken the tradition. Their spirit remains as vigorous as ever.

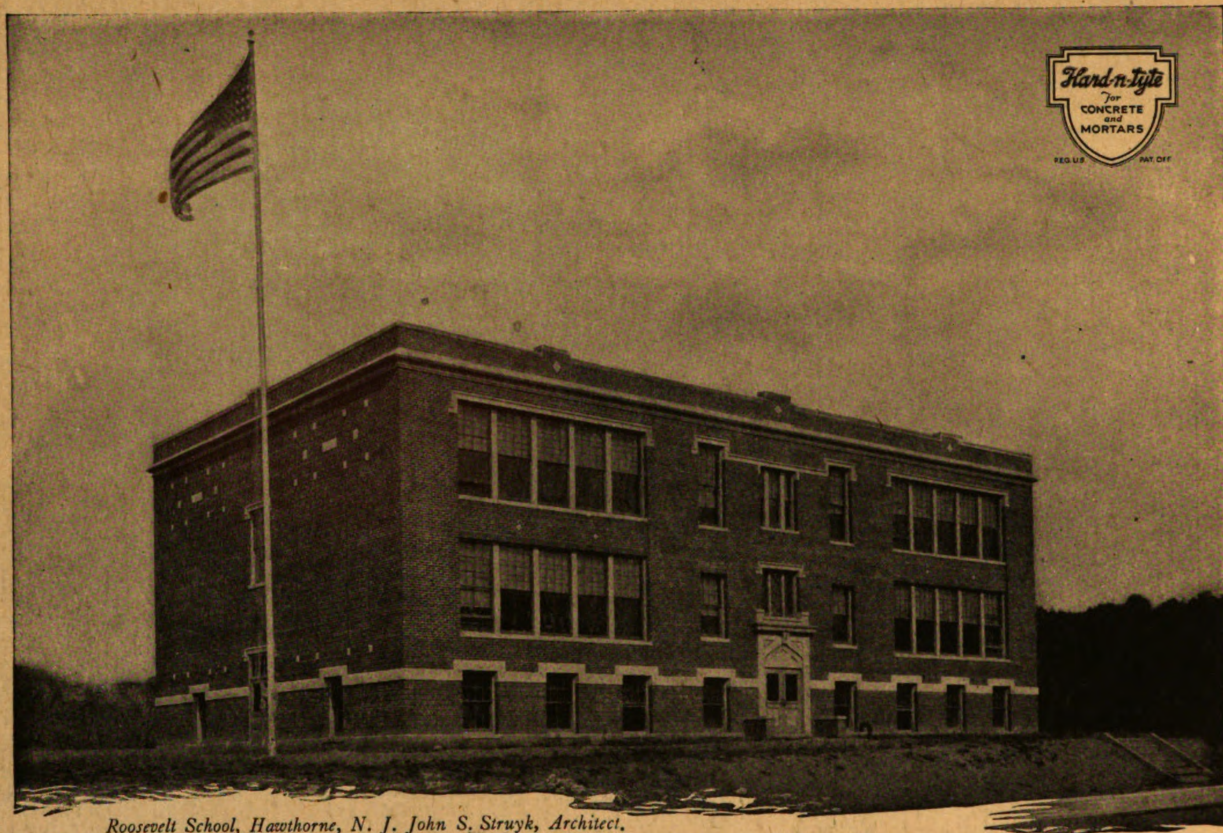
The present volume might be regarded as a study into the designing of the frame house, with its designing upon historical lines chiefly in view. The several forms of the "colonial" are considered, the "American Georgian" and the "classic revival," the Italian and Spanish types, and such comparatively late styles as the "Pacific coast bungalow" type, and in most instances the work contains illustrations of excellent examples of old work of each kind together with illustrations of modern houses of these same types, obviously inspired by if not actually based upon the old, and floor plans of the modern examples, the adaptations being designed in excellent taste. Whereas in colonial days people were satisfied to build their homes in the styles prevalent in their localities, the development and growing independence of the individual in America now call for a more diversified expression than was found in any one regional type. But no matter how creative a man may be, he can make his house successful only by acquiring an accurate vocabulary of forms and details of the style that appeals to him, and by entering thoroughly into the spirit of its traditions.

While frankly devoted to the interests of building of wood, the work is of great value to architects and to anyone interested in the general subject of domestic building, and particularly valuable are its chapters on "Selection of a Style," "Planning the House," and "Proper Use of Lumber," which considers its use for interior work as well as for exterior construction. Since the design and plan of the modern houses are such as will readily commend themselves for practical use, the publishers are prepared to furnish plans and working drawings from which they may be built. The title of the work suggests its broad treatment, which covers considerably more than the building of frame residence structures.

THE ARCHITECTURAL FORUM

AUGUST 1922

SCHOOL BUILDING NUMBER



Roosevelt School, Hawthorne, N. J. John S. Struyk, Architect. Kenney Construction Co., Contractor. Concrete Floors Treated With Hard-n-tyte.

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The ARCHITECTURAL FORUM

VOLUME XXXVII — NUMBER 2

CONTENTS for AUGUST, 1922

SCHOOL BUILDING REFERENCE NUMBER

ALBERT J. MacDONALD, Editor

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THE EDITOR'S FORUM

IN this, the School Building Number of THE ARCHITECTURAL FORUM, we present to the profession what we believe to be the most comprehensive and valuable single issue of an architectural magazine ever published.

If there be a measure of pride in this statement, it is justifiable as our acknowledgment of the sincere co-operation of a large number of architects prominently identified with the field of school building design. Through the earnest efforts of these architects this number has been made possible, and we take this opportunity of expressing our sincere appreciation of their valued co-operation.

When one examines the unusual qualities of design, construction and equipment expressed in the various types of educational buildings described in this issue there can be but one mental reaction: that is a definite appreciation of the immeasurable contribution which has been made during the past few years by the architectural profession toward the progress of the educational movement in this country. The requirements of the modern school building have become complicated by many important factors. Larger buildings are in demand; special educational systems and methods require special plan study and equipment; the growing use of the school as a community building brings added complications, and usually a limited appropriation of public funds enforces rigid economy. For these reasons the developments during the past few years in the field of school design and construction have attained unusual significance from the viewpoint of members of the architectural profession. There have been made many advanced studies in the economical construction of buildings; new theories have been advanced; new methods have been employed, and much valuable data has been developed.

It has become a recognized fact that educational activity in any community is limited not only by the capacity of local school facilities, but by the degree of "efficiency of purpose" developed in the planning of these buildings. Naturally, with the added complication of requirements in this type of structure, the problem has been definitely of an architectural nature. In the great recent revival of building construction in the United States school building has occupied an important position. In many communities the appropriation of public funds for educational buildings has been greater than for any other single purpose. Every indication points to the fact that vast expenditures for new buildings in this field will continue for many months to come. These are the facts which have led to the publication of this special school issue of THE FORUM. Every effort has been made to present carefully a large number of the best examples of school work. All special types of buildings are represented, and specialists in school design have contributed important editorial articles covering a complete cycle of the important problems involved in the development of new school buildings. Practically all the information in this issue is here published for the first time, and much of this data has heretofore been retained as special knowledge in the offices where it has been developed.

Broad inquiry has indicated that the reference files of the average architect are weak in regard to information regarding school buildings. This number will, therefore, constitute a complete reference file for every architect on the subject of school building. From the viewpoints of school boards and school and public officials this issue of THE FORUM will be found to contain data invaluable when the subject of the new school building is under consideration.

This number is a permanent record of progress in school building up to the year 1922. It offers an unusual opportunity for school boards to consider ideas and suggestions which have proved successful in other communities; it will serve to broaden the local viewpoints and will, we hope, contribute to that interchange of ideas upon which all progress in any specialized field is based. In this issue we have departed from our usual editorial policy in that perspective sketch plans are occasionally shown. These have been selected to demonstrate valuable ideas developing in the rapid progress of knowledge in this field.

INTERNATIONAL CONGRESS OF ARCHITECTS

THE International Congress of Architects will be held under the auspices of the "Sociéte Centrale d'Architecture de Belgique" in Brussels, September 4–11, 1922. An International and a National Retrospective Architectural Exhibition will be held at the same time.

During, and ever since, the war the architects of various countries have been isolated from one another. It is an especially appropriate time for renewing these gatherings, when the Societe Centrale will be celebrating the fiftieth anniversary of its foundation.

REGISTRY OF SCHOOL ARCHITECTS

FOR the benefit of school boards, city officials and others interested in prospective school work, THE ARCHITECTURAL FORUM *has developed and will maintain a list of architects who specialize in the design of educational buildings of every type.*

Information regarding this list may be obtained by addressing the Editor at our Boston office, 142 Berkeley street.

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STATE NORMAL SCHOOL, NEW BRITAIN, CONN.
GUILBERT & BETELLE, ARCHITECTS

From the pen drawing by J. M. Rosé

The ARCHITECTURAL FORUM

VOLUME XXXVII | AUGUST 1922 | NUMBER 2

The School Plant in Present-Day Education

By WM. B. ITTNER, F.A.I.A.
Architect and School Specialist, St. Louis

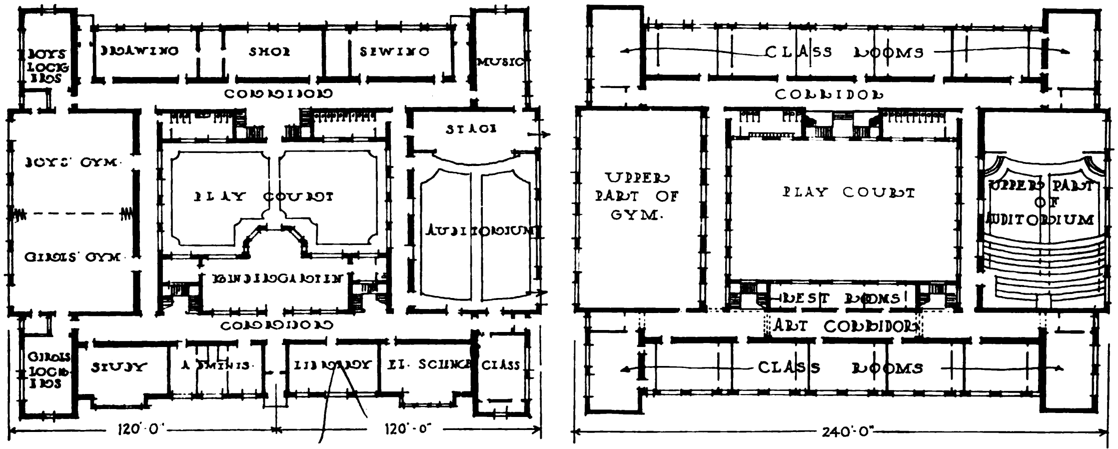
THE present-day educational objectives, health, the fundamental operations, manual skill, citizenship and the worthy use of leisure, have caused a renaissance in public education and in public school building. The shift of emphasis as regards the most vital consideration in education, viz., complete living, has occasioned a demand for a new type of school plant, and the more extended use of schools by the adult citizens of a community has given an impetus to a universal interest in the school environment. Education today is a continuous process, with the public school serving all ages.

Fundamentals in Present-day Education Must Guide the Development of the New School Plant. A school plant developed in harmony with this enriched and expanded curriculum, with the change of emphasis and the increasing demands by grownups, will rapidly become a vital and effective agency for human advancement. Its inviting exterior will represent the best, most thoroughly planned structure in the community, and its interior the best of all places for work, recreation or study. Its architecture will evidence individuality and be indicative of the rich and varied facilities within. As a model for sanitation, lighting and ventilation it will have no peer. What a change, indeed, from the old "school-housey" school, with its uninviting, monotonous, dead appearance, its inadequate site, and neglected surroundings!

All Communities Can Afford the Enriched Modern Type of School. Of course the eternal question of cost arises, but with the new science of school organization and management the matter of cost is comparatively favorable to the new type of school, and when the extended service, the enriched facilities and the unlimited possibilities are considered, the new school represents true economy.

Costs are intimately connected with service and efficiency. Architects can plan buildings so that maximum use is made possible and multiple use suggested. After that, however, the buildings' service must depend on skillful organization and adminis-

A Present-Day Elementary School. The Bryan Mullanphy School, St. Louis
Wm. B. Ittner, Architect



Plans of Typical Elementary School. Wm. B. Ittner, Architect

tration. Public school buildings can be planned to meet economically the demands of the enriched curriculum only when, by skillful administrative methods, all parts of the building are brought into complete rather than partial use.

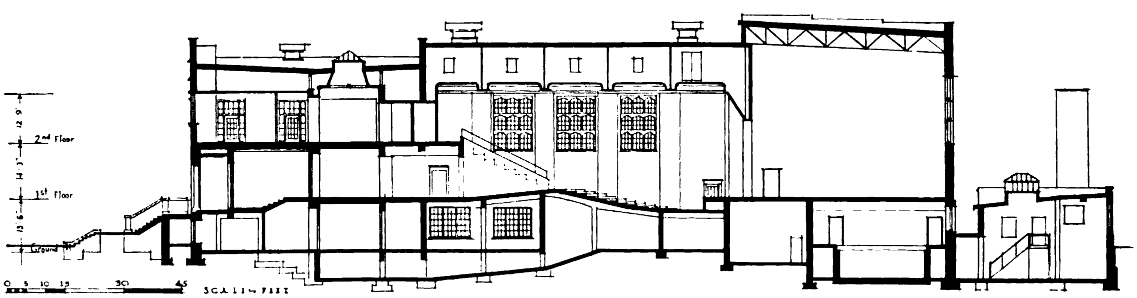
Health as an Educational Objective. The promotion of health of youth and adults is, in general, a community problem. By far the most efficient factor through which the community can work is the public school. The school is the place to which both the pupil and parent body are accustomed. It has the children the greater and best part of the day for all types of activities and is the most logical center for the distribution of all sorts of health propaganda.

Health as a fundamental claims a prominent place in the curriculum as far as time and instructional forces go. Automatically, then, it must receive foremost consideration in the planning of the school. But if the school plant is to serve a complete health program, the schoolhouse planner must have a clear idea as to the nature and extent of the health activities.

Every School Building Should Be a "Hall of Health." The initial requisite to health education is that the complete school environment should be a model for health. To accomplish this desired goal, sanitation, cleanliness, perfect lighting, airiness and cheerfulness must, of necessity, constitute the eternal, unwritten laws of successful school planning. Proper location of the school plant, a generous site, the "open plan" type of building, and efficient administrative and janitorial service ought to result in safe, well lighted and properly ventilated work, study and recreation quarters.

Gymnasiums and Playgrounds Are Essentials in All Types of Schools. All health programs include physical activities in gymnasiums and playgrounds, physical examinations, medical inspection and instruction in personal and community hygiene. Therefore, gymnasiums and playgrounds for boys and girls, showers, medical and consultation rooms are necessary to a complete physical education equipment. Swimming pools, if properly installed and carefully supervised, always add to the educational interest as well as to pleasure. The extent of physical education and recreational quarters naturally varies from one gymnasium and a minimum sized playground in small schools to several specialized gymnasiums with complete accessories and a large acreage for play and athletics. The school plant, however, which offers inadequate health facilities for its needs, cannot claim to be classified as a modern school.

Adequate and Well Planned Physical Education Quarters Are Community Assets. Perhaps no facilities in the school plant are more inviting, more stimulating to the youth of all ages, and more attractive to the adult citizens than spacious, well developed and equipped physical recreational areas, both outdoor and indoor. Certainly no other parts



Longitudinal Section, Fargo High School, Fargo, N. D.

A Junior-Senior School Plant, Fargo High School, Fargo, N. D.

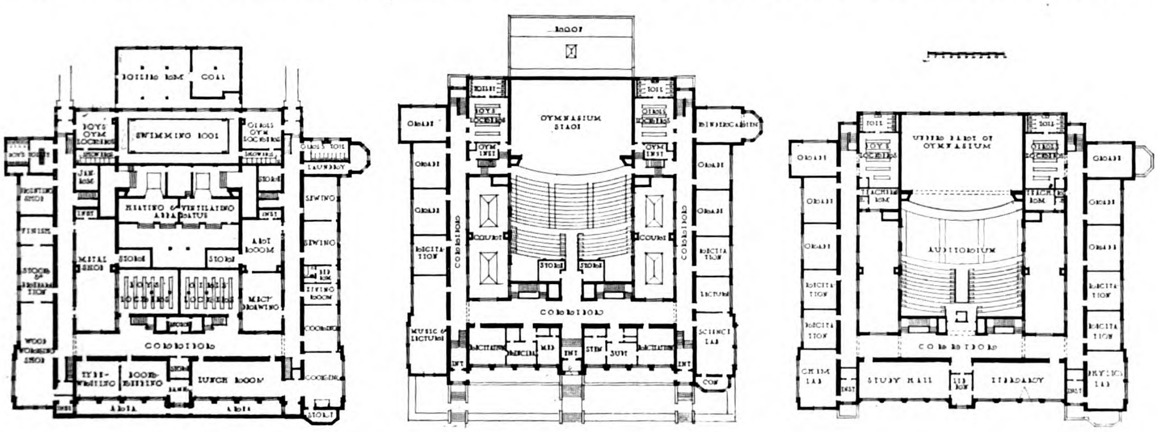
Pupil Capacity 1,450 Cost per Pupil, $261.81 Cost per Cubic Foot, 19.32 cents Built 1917

Wm. B. Ittner, Architect

of the school plant can do more to correct delinquency and truancy. Nothing else has so direct an appeal to the expanding physical and mental powers, and with health as an objective the health quarters are no longer luxuries to be added if funds permit; they have become essentials, and communities that can afford to build schools at all can afford the necessary aids to health.

Motor Activities in the Shops and Laboratories Are Also Considered Aids to Health. Aside from the entire school environment and the physical education group, the workshops and laboratories may also be considered health promotion facilities. The activities in the various workshops develop and train more particularly the eye, the arm, the hand and many of the smaller muscles, while the activities of the playgrounds and gymnasiums develop the larger muscles of the trunk and legs. It is granted, of course, that the motor activities in the workshops also have another distinct purpose, but the fact that they also serve for promoting health assures them a prominent place in the curriculum. Such activities, for instance, as wood working, clay modeling, forge, foundry and sheet metal working, nature study, horticulture, gardening and animal husbandry are examples of some of the motor activities that definitely minister to health, aside from their own intrinsic values.

Classrooms Constitute Only a Part of the Educational Equipment of Today. Schools always have, and still do include, classrooms, since textbook instruction will undoubtedly continue to claim an important place in the curriculum. There have been no radical changes in the physical attributes



Ground Floor Plan First Floor Plan Second Floor Plan

Fargo High School (Junior-Senior Grades), Fargo, N. D.

of classrooms. An elastic scale as a measuring rod for size of room and type of lighting has been evolved, and considerable improvement as regards interior finish and trim has been accomplished. Otherwise, the chief difference lies in the substitution of newer types of equipment, much of which is movable and adjustable.

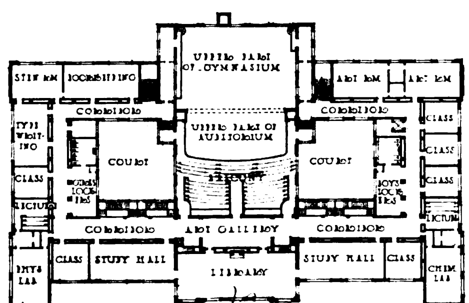
Laboratories Scattered among Classrooms Add Interest and Variety. Laboratories are increasing in number, both in elementary and secondary schools. This is natural, since the very essence of present-day methods of instruction is investigation, organization and interpretation of facts. The laboratory classrooms add materially to the interest of the educational environment and are salient factors in the promotion of the wider use of the school plant.

The Full Educational Possibilities of the Auditorium Have Been Realized in Comparatively Few Schools. The full possibilities of the auditorium as a socializing and community factor are just being realized, but its possibilities as an instructional force must be anticipated by the architect. Auditoriums that give best general service are those of medium size. In a system of schools there may be one or several large central auditoriums, but the majority may be medium sized. If these are planned with stage-gymnasiums, equipped with soundproof, movable partitions, they can always be enlarged for special occasions.

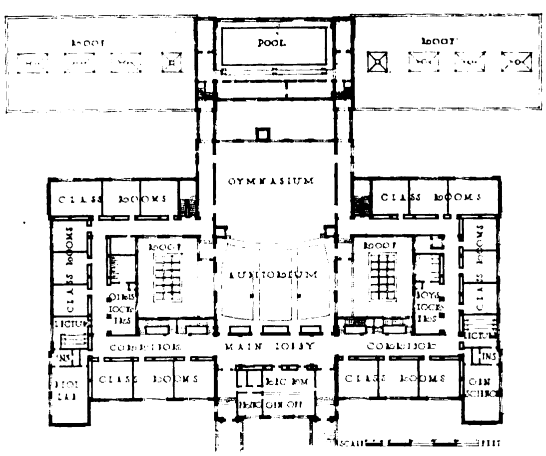
Success in Life Depends Much upon how Leisure Time Is Spent. It is a comparatively new idea to train for the worthy use of leisure, yet the masses of people today have far more leisure than formerly. All classes in the social strata recognize the need for daily leisure time; all recognize the importance of leisure time also in making or marring successes in life, both material and spiritual. Furthermore, all recognize the fact that there are both constructive and destructive forms of recreation and amusement. So it is really a sensible idea for public schools to incorporate as a fundamental, training in the various forms of wholesome recreation, physical, mental and spiritual.

The Enriched Modern School Offers Recreational Opportunities to Children and Adults. The leisure time of young folks is usually devoted to sports, reading, playing with a hobby, or passive entertainment. The desire for active forms of recreation generally leads. The analysis of adult leisure activities is similar to that of the younger folks. If, then, the school includes facilities to care for the leisure time of children, it automatically includes the major requirements for adults. Gymnasiums, playgrounds, pools and showers are probably the most potent factors in ministering to leisure time, since they offer active and attractive forms of recreation. When well correlated and artificially lighted for evening use, their possibilities as centers for wholesome amusement are multiplied.

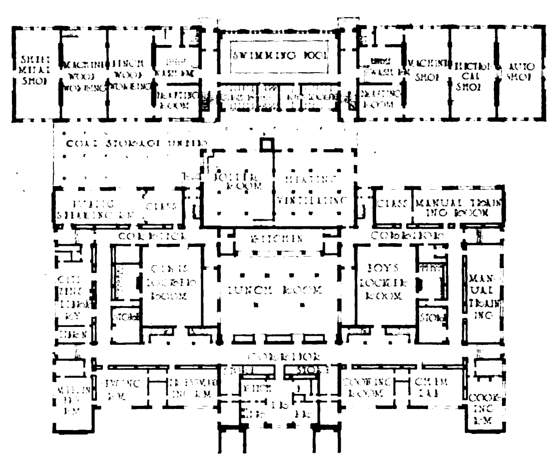
An unusual opportunity is offered to school libraries in extending their services to their immediate communities. Elements in their success include size, attractive interior, location in the building, and equipment. A library undersized, dark, gloomy, ill ventilated and in an obscure location has no community possibilities. It should be equivalent to at least two classrooms in size, should be lighted and ventilated both naturally and artificially, and located in close proximity to the main entrance. It is to the school auditorium that one must look for passive entertainment that will finally override the cheap, tawdry and sensational forms. Much is



Second Floor Plan

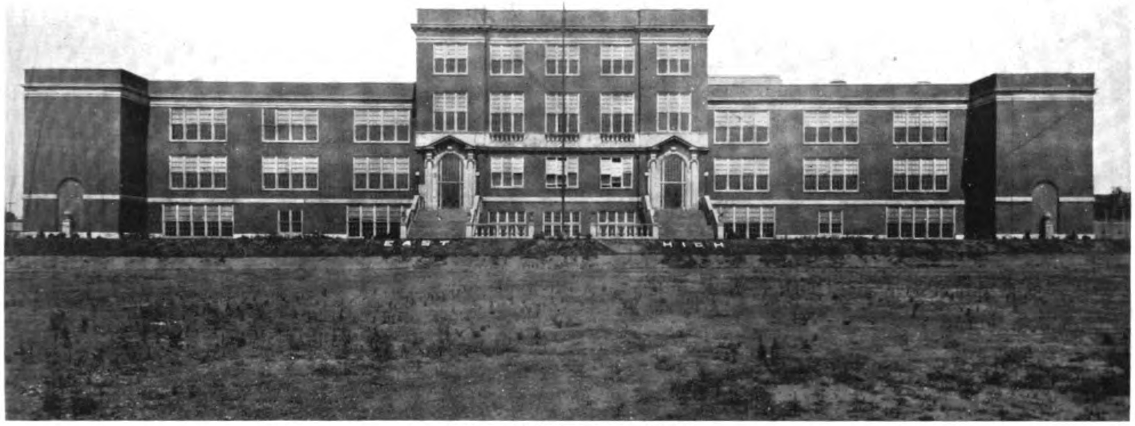


Ground Floor Plan

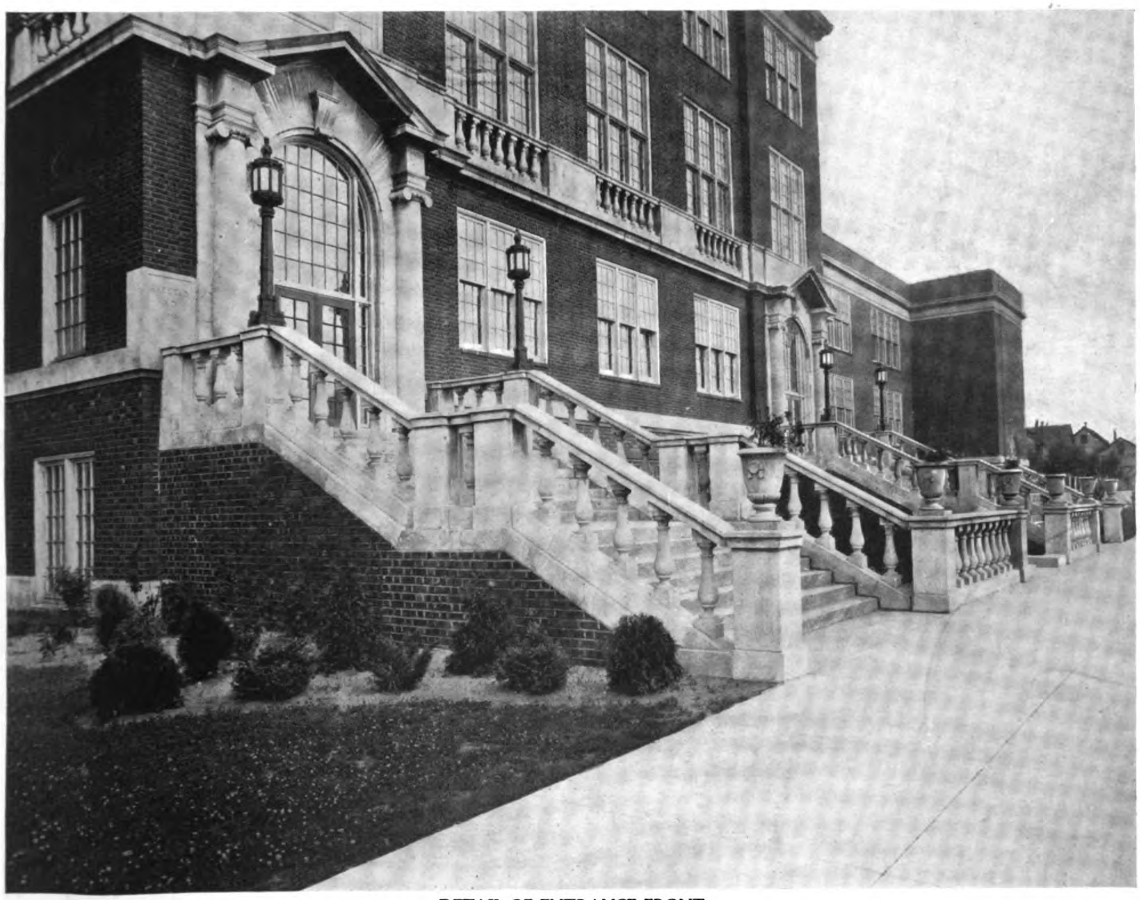


First Floor Plan

East High School, Erie, Pa., Wm. B. Ittner, Architect



GENERAL VIEW OF FACADE



DETAIL OF ENTRANCE FRONT

EAST HIGH SCHOOL, ERIE, PA.

WM. B. ITTNER, ARCHITECT

EAST HIGH SCHOOL, ERIE, PA.

Illustrations on Plate 17

THIS senior high school was completed in 1919 at a cost of $924,-337. It accommodates 2175 pupils, making a building cost per pupil of $424.98, excluding equipment.

The cost per cubic foot was 30.16 cents.

The exterior of the building is of face brick trimmed with Indiana limestone. The construction is fireproof.

JUNIOR HIGH SCHOOL, SAVANNAH, GA.
WM. B. ITTNER, ARCHITECT

JUNIOR HIGH SCHOOL
SAVANNAH, GA.

Illustrations on Plate 18

THIS school was completed in 1920 at a cost of $401,257.22. It accommodates 1020 pupils, making a building cost per pupil of $393.38, excluding equipment. The cost of equipment per pupil was $54.60.

The cubic foot cost was 38.11 cents.

The exterior of the building is of red face brick. The construction is fireproof.

already being done by means of juvenile plays and activities to accustom the parent body and interested friends to the school auditorium.

A few years ago it was my privilege and pleasure to plan what was probably the first enriched public school plant that gave unlimited opportunities both to elementary and secondary school children. The school became a revelation to me as I made my visits from time to time after its completion. It was the best representative of a people's university that I have seen. Adults were coming and going through the plant at all times, viewing the exhibitions in the spacious and well lighted main corridors, visiting the auditorium activities of the children and actually working in some of the shops, drawing and domestic art quarters. In the evenings it seemed that the whole community was at the school. After school hours and on Saturdays children were distributed of their own volition through the various parts of the plant that they loved best.

The criticism that special talents of children are ignored in public education has been offered. The school with an enriched environment, such as that mentioned here, an elastic organization and administration whereby all quarters count for maximum use, certainly ministers to talents of children. The criticism therefore may be directed toward the school of yesterday.

Variations in Methods of Securing Enriched School Plants. In attempting to secure enriched equipment, school communities adopt varying policies. The usual plan in the larger cities is dependent on what is known as the "6-3-3" organization. This type of school organization calls for a set of elementary schools to care for the first six grades and kindergartens, a set of junior high schools for the seventh, eighth and ninth grades, and a restricted number of senior high schools for the tenth, eleventh and twelfth grades. The zoning plan locates the elementary schools from one-half to three-quarters of a mile apart, the junior schools as central as possible to a group of contributing elementary schools, and the senior schools reasonably central to groups of junior plants. For economical reasons, the elementary and junior schools are planned for a capacity of at least 1,000 pupils. It is recommended that senior schools care for a greater number.

For Smaller Cities the Best Plans Involve a Minimum of Segregation. There are two methods of developing modern educational equipment for smaller cities:

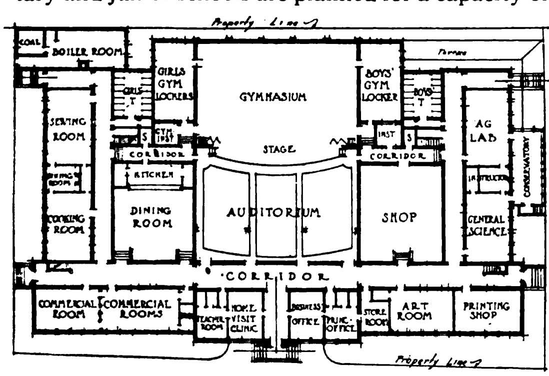
1. A set of elementary schools for the first six grades and kindergartens, together with a set of combined junior-senior plants;

2. Complete, centralized units including both elementary and secondary school grades, thus giving unusual opportunities to all children.

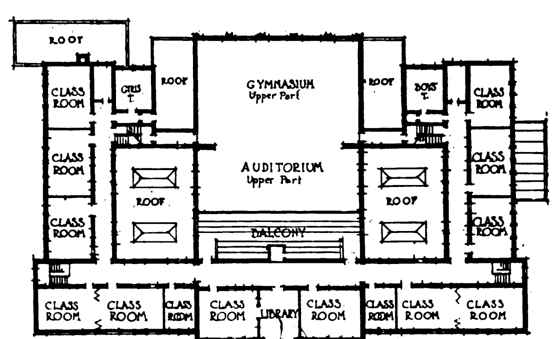
When the first policy is adopted, viz., the segregation plan, the principle of zoning for elementary schools in large cities applies also to small cities. Owing to the deficiency of numbers, the junior and senior grades are combined and these junior-senior plants distributed in proper relationship to the elementary schools. Any high school equipped for senior grade purposes is entirely sufficient for junior school needs. For instance, a senior high school includes more specialized laboratories and shops, a greater expansion of physical education facilities and a larger auditorium. Hence nothing is offered by the junior plant that is not included.

Centralized Complete Units Have Advantages for All Communities, but Especially for Small Cities. The establishment of complete centralized school plants, properly zoned to equalize distances and sufficiently enriched to meet the needs of all grades, has been adopted in comparatively few communities. Economically, the plan is superior to the others, and educationally it insures the fullest possible opportunities for all pupils. The present-day aim of education is social, but certainly there is nothing democratic about segregated groups of schools. If there is no convenient dropping-out place along the school course, perhaps the exodus will not be so great.

A concentration of elementary and secondary grades involves departmentalization of the former, although not to the same extent as the latter. That provision is favorable, however, since it is only by means of some method of departmentalization that elasticity of the school program is secured. Just



First Floor Plan



Second Floor Plan

Junior High School, Savannah, Ga., Wm. B. Ittner, Architect

what one of these centralized plants includes may be exemplified by a brief description of one actually in existence.

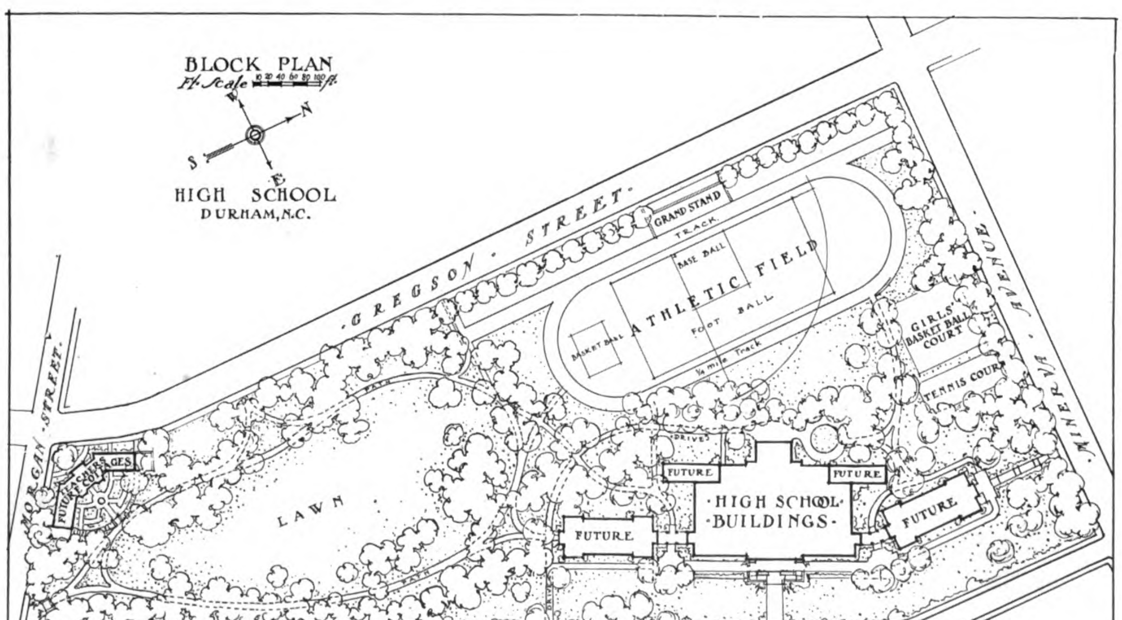
High Lights in a Complete Centralized Unit. The building, two stories in height and with a capacity of 2,000 students, has a favorable setting on a 14-acre site. The foreground is planted and resembles a miniature park where all who pass by may rest and cool themselves on the shaded rustic benches scattered about. Children's gardens are noted in close proximity to school greenhouses, and just beyond an expanse of smooth ground is relieved here and there by playground and athletic apparatus.

On entering the building the first thing that catches the eye across the well lighted corridor is the sunset of the stage—scenery. Indeed, one passes toward it and beholds an auditorium as light and airy as the out-of-doors, rising in amphitheater fashion.

Only a few of the classrooms have desks. Tables and chairs seem to rule, and every room reminds one of a busy laboratory. The boys and girls in the workshops and laboratories do not even notice us. They are all too intent on their projects. Very young boys are in the wood working shops and are occasionally permitted to observe the advanced work of the older boys in machine and metal shops, forge and foundry. Girls may elect sewing and elementary cooking at a very young age, and their enjoyment of this privilege seems unbounded. The greenhouses lead directly to the school gardens.

The physical educational facilities are especially complete. Occasionally there are groups of the younger as well as the older children in the gymnasiums and on the grounds, and in swimming it is not at all unusual for the younger to excel the older pupils. Ascending to the second floor, attention is arrested by the school library located midway between the first and second floors, for accessibility to all classrooms as well as to the main entrance. Again, it is a delight to linger in the corridor, since on the second floor it is a veritable art gallery. The art and music rooms with adjustable equipment for varying sizes are also located on the second floor. Altogether the school is a miniature democracy; high school students and primary pupils mingle in the most natural manner about the building and grounds. If training for citizenship is a fundamental in education, the training, although to a certain extent incidental, is certainly in evidence.

Economically, no other plan can compare with that of centralization. Enriched facilities are demanded, since the secondary schools are included, but the equipment is available to all. Automatically, the plant gives a maximum of service and the per capita cost is correspondingly reduced. There may be certain educational reasons, unknown to the architect, sufficient to abrogate the complete school. Criticisms of the plan, however, should be scrutinized carefully. To all appearances, it constitutes the real American public school of tomorrow.



Site Development, High School, Durham, N. C.

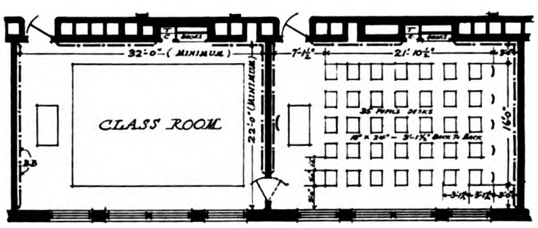
The property consists ot 17½ acres with a slope of 12 feet in width permitting daylight basement rooms and minimum of expense in developing athletic field. Teachers' cottages are a unique feature

Milburn & Heister, Architects; Wm. B. Ittner, Consulting Architect; Thomas W. Sears, Landscape Architect

Planning Details of Schools

By WALTER H. KILHAM, F.A.I.A.
Kilham, Hopkins & Greeley, Architects, Boston

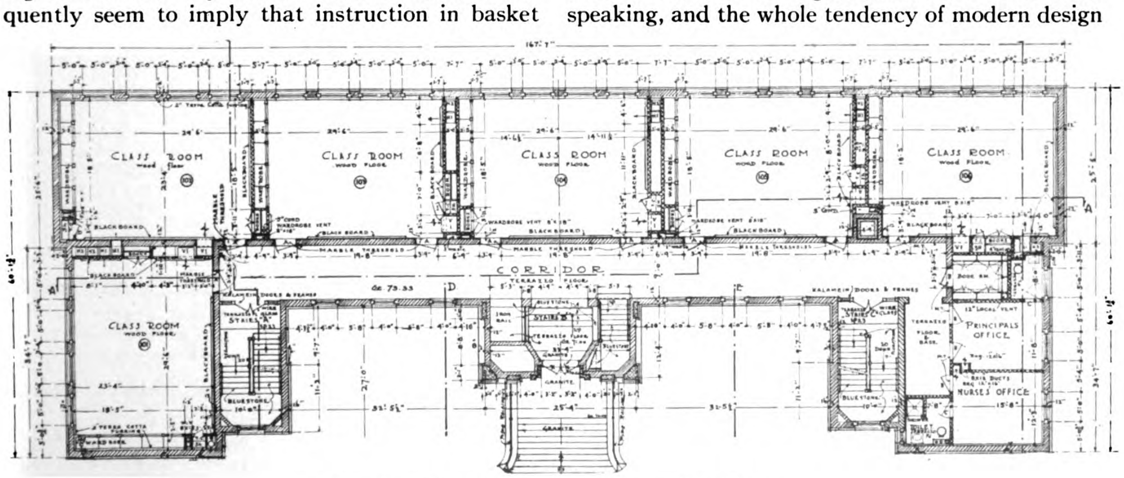
VICE - PRESIDENT Coolidge once wisely said something to the effect that if there were less of the show window in political life and more midnight oil, some distinct advantage might possibly accrue to the general public as well as to the politician himself. The same remark might with some justice be applied to schoolhouse architecture. The designing of school buildings has for a long time been quite generally regarded as a plum to be handed to some favorite son or a political ward leader, rather than as a subject of any careful study by a trained expert; but there are definite signs now that the prevailing high taxes are beginning to cause the taxpayers to look critically at their new school buildings and rather pointedly to express a desire for watertight roofs and walls, substantial, easily cleaned finish which will reduce the cost of upkeep to a minimum instead of tawdry ornaments, and a simple and elastic type of plan which will easily accommodate itself to changing educational fashions; and it is fairly safe to predict that American school architecture for the next decade or so will be obliged to conform rather closely to their theories. These ideas have constituted in a general way the principles which we have followed in our school design for the last 20 years and are expressed more in detail in these pages.



Detail Classroom Plan from Brookline (Mass.) High School Showing Recessed Corridor Doors and Communicating Rooms

Although the programs which enterprising building committees lay before their architects frequently seem to imply that instruction in basket ball and the manufacture of wooden stands for graphophones are more desired than are the "three Rs," there is some ground for the assertion that the humble classroom still remains the backbone of schoolhouse design, just as infantry is said to be the mainstay of an army, and no part of the building should receive more study as to its size, exposure and finish than this apparently simple and prosaic unit.

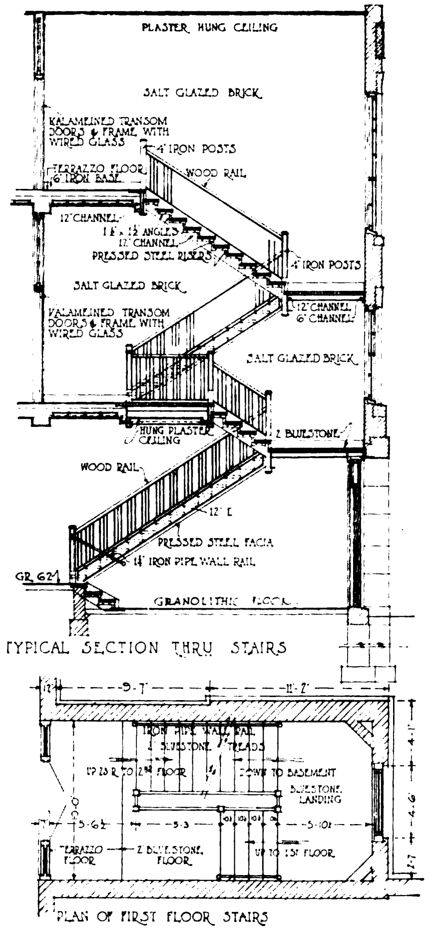
Size of the Classroom. It must, on the average at the present time, accommodate 35 scholars, for the few towns which are holding out for 40 or 42 pupils per teacher are in a diminishing majority, and a few years more will see that factor reduced to 30. Its size and shape then become the architect's first preoccupation, for it will become the dominating unit of the entire building. Given the sizes of desks which are to be used, and supposing them to be arranged five rows deep from the windows and seven rows long, the room, according to Massachusetts standards for a high school, will have a wall aisle on the window side 3 feet wide, four aisles each 1 foot, 6 inches wide and an inner wall aisle of 3 feet. The rear aisle will be 3 feet wide and the desks 3 feet back to back. This totals up like the annexed diagram, and if we allow 7 feet at the front, the room will be 22 x 32 feet, a comfortable size. The committee may prefer to increase this to give a little more feeling of space, but a room over 32 feet long becomes more difficult for speaking, and the whole tendency of modern design



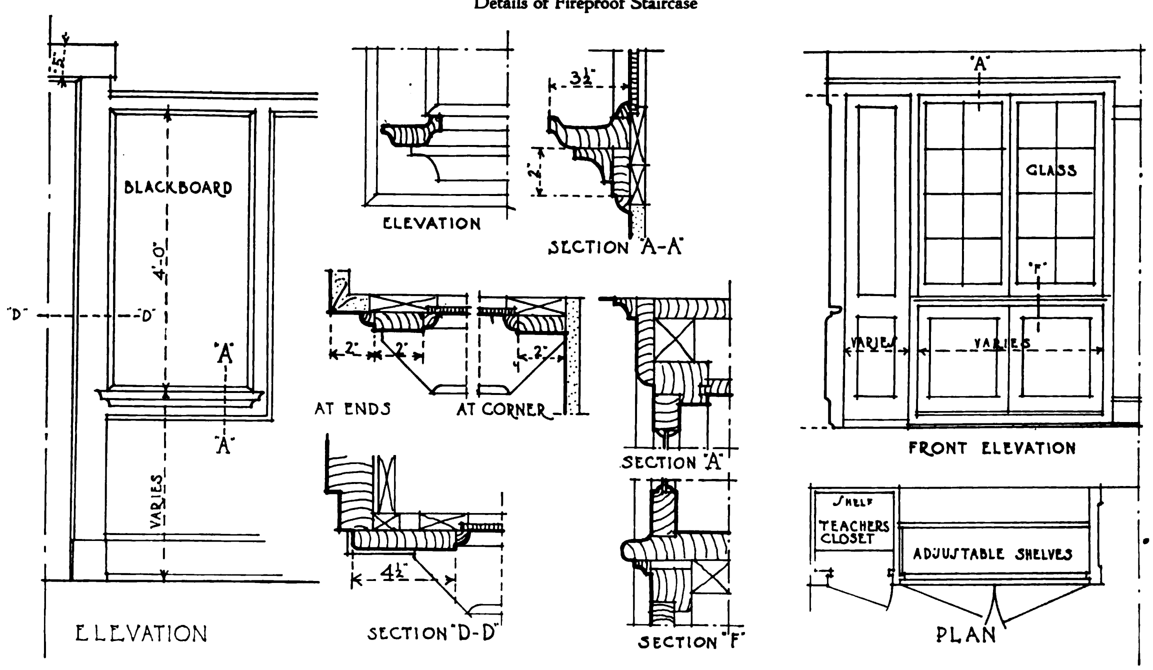
First Floor Plan of Elementary School, Brighton, Mass.
Note stairs at ends of corridor with fire-resistive enclosing doors
Kilham, Hopkins & Greeley, Architects

is to keep the rooms as narrow as possible while preserving good proportions so as to get all the seats as near as possible to the windows. Furthermore, there is always the desire of the educational authorities to hold down the size of the room so as to prevent overcrowding — which usually acts to prevent the use of rooms much over the minimum size. It would be a great advantage from the lighting standpoint if it were possible to lay out a room only four rows wide and eight or nine rows long, which would give a room width of only 18 feet, 6 inches, reducing the cost of floor beams and much simplifying the architect's next problem, that of supplying the legal amount of daylight, but such a room is not in favor with educators.

Lighting. Most states are quite particular in requiring that rooms shall be lighted from the left hand side only and that the window wall shall contain a net glass area exclusive of sash and muntins equal to one-fifth the area of the room. This law, like many other schoolhouse regulations, is founded on rather empirical premises, for it entirely fails to take into account the depth of the room from the windows. For example, a room 22 x 30 contains 660 square feet which calls for 132 square feet of glass, but if the room were say 26 x 26 feet, *i.e.*, 4 feet deeper, its area of 676 square feet would, according to law, call for only about the same glass area, a manifest absurdity for the room would be less well lighted. To provide the necessary glass area, the architect is often driven to the use of expensive steel construction for the window wall, particularly if the sub-rule of having no window nearer than 6 feet to the front of the room is followed. I have never been able to see the sense in this rule, as it penalizes the teacher without any corresponding benefit to the scholars, and interviews with several able teachers confirm my own opinion. The windows must be square-headed and run as close as possible to the ceiling, a drop of more than 8 inches not being permissible. Large piers along the window wall are objectionable and should not be used if they inter-

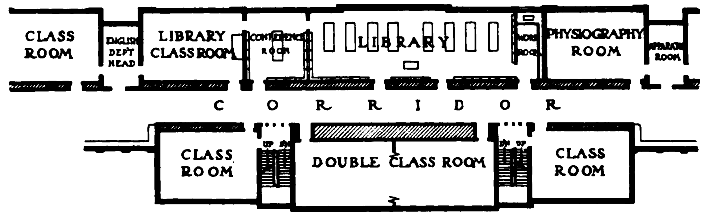


Details of Fireproof Staircase



Details of Blackboard and Classroom Finish

Kilham, Hopkins & Greeley, Architects

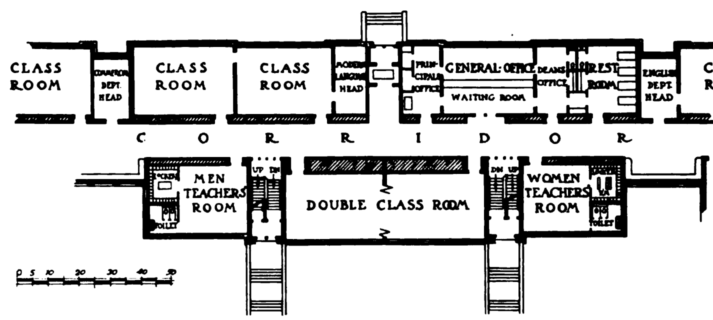


Plan of Library Suite, Brookline (Mass.) High School
Kilham, Hopkins & Greeley, Architects

fere with the diffusion of light, and transoms, on account of the difficulty of cleaning the upper sashes, are generally best omitted. Evidently outside conditions, both of climate and of surrounding objects, have an influence on the lighting of the rooms and must be taken into account; southern California, for example, needs less window space for lighting than Maine, but the 20 per cent rule works fairly well for rooms not over 24 feet deep and less than 12 feet high. I do not consider windows on a second side of the room objectionable for shops, laboratories, or other rooms where the pupils can move about and are not transfixed in one position; in fact, the teachers seldom object to windows at the pupils' backs, even in a classroom.

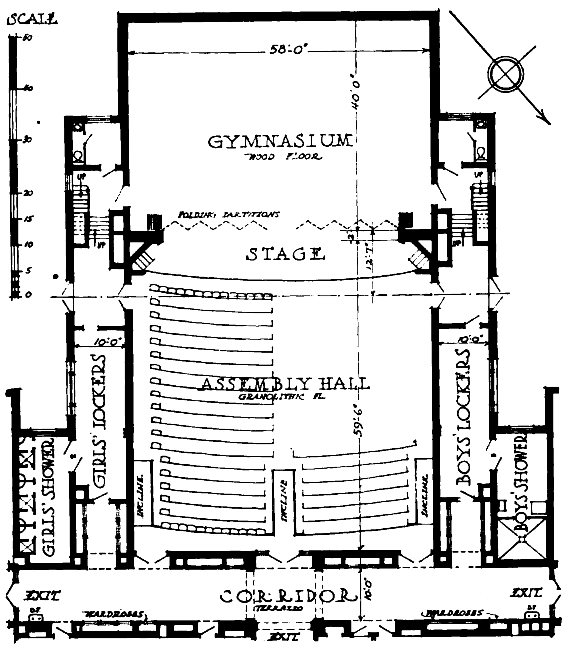
The type of window to be used has next to be decided, whether the ordinary "double hung" or some pivoted type, admitting a free air space equal to the entire window opening. I have found that the teachers generally like the pivoted type in order that they may open them and secure an invigorating flow of outside air, in defiance of the engineer's nicely calculated ventilating system (and the taxpayers' coal bills), while the janitor views them with undisguised contempt because he has to go around and fasten them after school so that they will not be blown open at night and cause possible damage by rain. The custom of dividing the sashes into numerous small panes prevents loss of large panes by breakage, but increases the cost of cleaning. I think that a pane size of perhaps 18 x 24 inches is a good compromise and obviates running into very large sizes which, unless of plate glass, present a poor appearance. Skylighting of classrooms is an expedient of doubtful value for the comfort of the pupils and in cold climates causes undue expense for heating on account of the exposure.

Exposure. The ideal classroom exposure is now held to be southwest, and then west, east and south in the order of preference named. Southwest allows sun to reach the room in the afternoon, after the class has gone without annoying glare during school hours. East and south cause so much glare during the forenoon as to necessitate drawing the shades. Because sunlight is supposed to have some germicidal as well as cheerful influence, north lighting is generally held in disfavor for classrooms, though it is considered allowable for shops, drawing rooms, etc.; nevertheless many teachers favor it on account of its restful effect on the pupils and freedom from eye strain. Some have told me that the amount of "wriggling" noticeable among the pupils was perceptibly less in north lighted rooms. Whatever the points of the compass may be, no room devoted to instruction should ever face on a court, and in fact aside from the wide and open 1-story "patios" used in some California schools no courtyard should ever find a place in a northern 2- or 3-story school building. The theoretical garden treatments of 50- or 60-foot courts with seats, grass plots, etc., with which inexperienced architects sometimes delude committees into accepting an attractive (paper) plan, prove in execution to be dismal failures, impossible to grow anything in and full of dirty snow and ice in winter, while the noise of even a few persons crossing them and talking becomes so intensified as to render the rooms useless. Light courts for toilets, coat rooms, etc., starting at the top of the lower story, are often useful, but are not suitable for lighting classrooms.



Plan of Administration Suite, Brookline (Mass.) High School
Kilham, Hopkins & Greeley, Architects

Opinion now seems to favor a single exit from the classroom in order to afford better control by the teacher. Some states, however, require communicating doors, without locks, between rooms so as to provide a secondary route to another flight of stairs. While this has its disadvantages, it at least allows the pupils, in case they should bolt, to be received by another teacher and not become jammed in the old fashioned coat rooms. A modern building, with fireproof stair towers and smoke doors on the stairs, ought to be panic-proof and probably is, but so far as I know a real test of such a building has not been made. In any event, there should never be more than one door to the same corridor. Classroom doors should open out and contain a good sized area of glass which may well extend the entire length of the door. Transoms are dirt collectors and a useless expense. If the stacks run parallel to the corridors there will be a recess about 3 feet deep at each door,



Detail Plan of Modern Stage-Gymnasium, Wm. G. Crosby High School, Belfast, Me.
Kilham, Hopkins & Greeley, Architects

and if the door is hung on the inside of the recess, flush with the side of the room, the recess will protect it when open, while if hung on the outside it will project into the corridor, causing both an obstruction and a possible source of accidents. These doors generally have a four-lever mortise lock, always free to open from the inside, master keyed, cast brass knobs (not lacquered, as the lacquer wears off unpleasantly), cast brass card holders and 2-inch numbers. The stopwork of the lock is often arranged to be operated by a key.

Other Details of the Classroom. The blackboards will ordinarily occur on the walls back of the teacher and opposite to the windows. The best place for the wardrobes is at the back of the room, opposite the teacher, but this presupposes stacks at right angles to the exterior wall, an arrangement now generally abandoned in favor of carrying them parallel to the corridor. Besides the wardrobes the room will be furnished with a built-in bookcase with glass doors above and drawers below, a small closet for the teacher's wraps, and the usual clock, telephone and ventilating apertures and radiators. The trim is substantial and simple, with all plaster corners well protected.

Corridors. Opinions will vary as to width of corridors. Like a street, they should be able to easily accommodate the population on each side when the classes change periods, but if they are made unnecessarily wide for this purpose there will be a great waste of costly space. Ten feet in the clear is common, and this will appear wider if the open plan is used, with windows along one side, and if wardrobes or lockers are built into the thicknesses of the stacks and the room doors do not open into the corridor space it will be found ample. In any event, corridors should always run towards the light, have floors of noise-absorbing material, and walls durable and easily cleaned. Battleship linoleum for floors and glazed brick for walls fulfill these requirements. Drinking fountains with side-stream bubblers are preferably placed in alcoves in the corridors so as to create no obstruction.

Wardrobes. The separate dressing room and the large locker room in the basement seem to have generally given way to a system of wardrobes arranged around the building on different floors. Some favor alcoves or special rooms for this purpose, but many administrators object to anything which allows space for concealment. In an elementary school, where each pupil has a home desk, the wardrobes may open into the rooms, but in a high school they usually open into the corridors, and if neatly constructed will not disfigure the walls, as the entire wall above the 6-foot line is left clear for pictures, etc. Thus arranged, the entire system is easily supervised, and pilfering, that bane of the school principal's life, may be eliminated.

Stairs, Ramps and Exits. No building or part of a building should have less than two means of egress, entirely independent and located as far apart as possible, and more should be provided in proportion to the building's size. Stairways should be located at the ends of corridors, so as to preclude any dead ends of corridors beyond the stairways which might form traps. They should be enclosed in stair halls, separated from the corridors by fireproof, self-closing doors and located between the corridor and the exterior wall so as to lead directly out of doors. I cannot agree to the practice which prevails in some sections of locating stairways in the interior of a building, with wells open from bottom to top, and delivering the pupils in the main corridor of the first floor from which they have to seek an exit, instead of in the open air. Such stairways may become immediately impassable on account of smoke, even if the building is fireproof and the fire insignificant. It is true that the narrow ends of stair wells do not always compose well on the elevation, but the safety of the pupils should be the paramount consideration.

The rise and tread should be easy, say about 6½ to 7 inches by 10½ or 11 inches, free from winders, and the width from 4 feet, 6 inches to 5 feet. This will easily accommodate two lines of pupils, each within reach of the handrail. A third line would need a center rail. Over 5 feet is too wide. Treads should be of some material which affords a sure footing. My observation shows that at the ordinary rate in changing periods a class completely descended a flight of stairs, marching two abreast, at the rate of one person per second, *i.e.*, a complete class of 40 persons in 40 seconds. Some authorities say that 120 persons, marching 2 abreast, can pass a given point in less than a minute. One of

our school buildings, containing over 2,000 pupils where I made observations, is emptied at the fire drill in 2 minutes, using seven exits. If the New York rule, allowing not over 3 minutes for completely vacating a building is followed, this would seem to indicate the need of providing a minimum of one staircase for about every 450 persons, but I should regard this provision as insufficient. Of course this is independent of natural convenience and special locations such as balconies in auditoriums, and in large buildings additional stairways —which may well serve special groups of rooms— should be added. I recently saw the plan of a large high school in which in going from a given point to a corresponding point on a different floor a horizontal travel of over 250 feet was necessary, which is both fatiguing and wasteful of time, and convenience of circulation should be considered as well as safety from fire. It is hardly necessary to say that stairs should be fireproof, or at least fire-resistive, with windows to the outer air and absolutely without closets under the lower landings which are sure accumulators of rubbish.

The railings should be of simple pattern, with mainly vertical members to avoid lodgement of dust, and the newels should be perfectly plain and free from sharply projecting mouldings. Solid balustrades have found some favor in order, theoretically, to avoid embarrassment of girl pupils, though since the prevailing styles have come in it is the boys who seem more likely to be embarrassed.

Ramps. These are undoubtedly of great comfort and value, but on account of the space they occupy are not in common use. Some examples were shown in THE ARCHITECTURAL FORUM for September,1921. The rise should not be over 1 in 10, and the surface should be treated with some form of non-slip material.

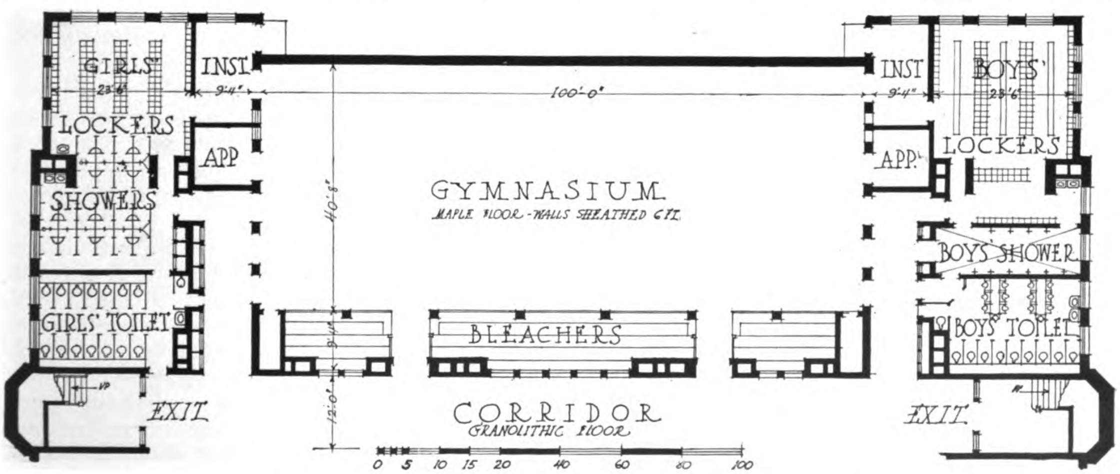
Toilets. Generally toilets are now located in well lighted, single groups (*i.e.*, one boys' and one girls') on each floor, and are equipped with plumbing fixtures in approximately these proportions:

Pupils	Water Closets Girls'	Water Closets Boys'	Urinals	Slabs Ft.	Slabs Ins.
50	3	2	2	2	8
100	4	3	4	5	4
200	6	4	6	8	0
300	8	5	8	10	8
400	12	8	10	13	4
500	14	9	12	16	0

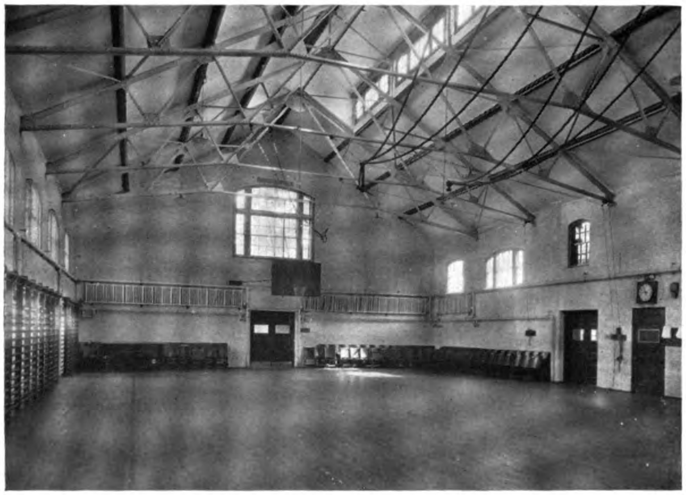
The floors and walls should be non-absorbent and easily cleaned; for example, asphalt floors and glazed brick walls. The water closet stalls must have partitions and doors on legs at least a foot above the floor, and much careful study should be given to the types of fixtures and fittings employed, with a view to the utmost ease of cleaning and inspection, as well as to special exhaust ventilation. A safe rule provides that windows, admitting daylight, be of one-tenth the toilet room's area.

Administration Suite. Ordinarily the administration suite will consist of a private office and toilet for the principal and a room for his secretary and clerks of a size proportionate to the building, with a long counter under which the filing cases are installed to separate them from the public waiting space. A vault and good sized book storage room complete the ordinary equipment, but in a large co-educational school the dean of girls will require an office similar to the principal's, with the school nurse's room or clinic adjoining. While I fully concur in any attempt to give a cheerful and attractive air to a schoolhouse, I feel that such an accessory as a fireplace in the administration suite is unnecessary, as it is never used and occupies valuable space. A retiring room for girls is appropriately placed next to the nurse's room, and a rest room is desirable for girls, while accommodation for boys who may have met with accidents can be made in connection with the clinic or the male teachers' quarters.

Library. The school library is a feature that is only beginning to come into its own. It must be located centrally, particularly in relation to the Eng-



Plan of Gymnasium and Locker Rooms, South Junior High School, Waltham, Mass.
An arrangement showing economy in floor space and simplification of plumbing
Kilham, Hopkins & Greeley, Architects



Gymnasium of High School, Milton, Mass.
Kilham, Hopkins & Greeley, Architects

lish and language departments, and is generally furnished with tables seating not over six. The checking desk is arranged near the entrance. A classroom with stereopticon adjoins the library, and a workroom with good light and a sink is necessary for the attendant who takes care of the books, photographs, etc. The cases will be designed according to the local requirements, but the room is entitled to a little architectural treatment and a fireplace is permissible, and if it could be used only now and then would be desirable.

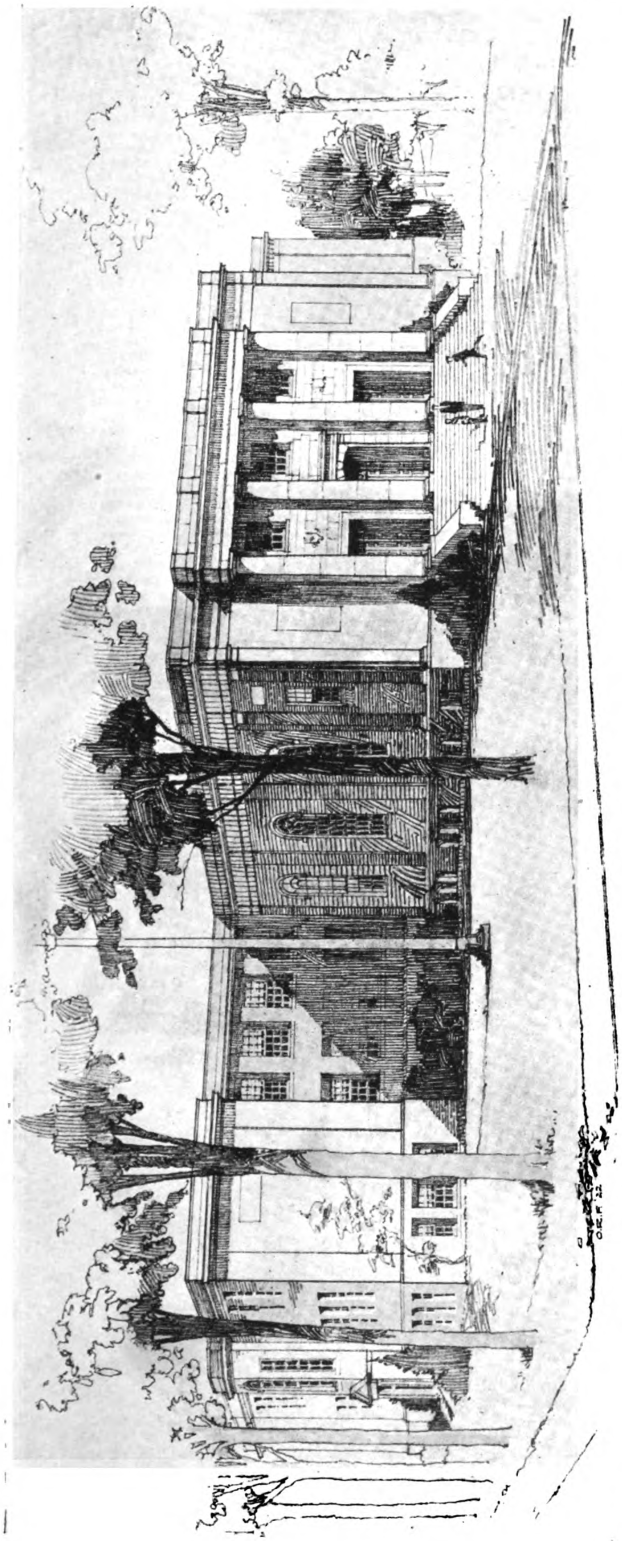
Laboratories. The chemistry laboratory together with the rest of the science department is often located in the top story with the idea of providing easy removal of odors. This involves long runs of drains to the ground, all subject to corrosion and leakage, and there is much to say in favor of placing these rooms on the ground floor where leakage will do no harm, and considering that as many gases are heavier than air as are lighter, the question of odors is at least no more difficult. Furthermore, biology and agriculture are fully as well taught in the lower stories. Because the pupils can move about, the southwest exposure is not essential and a north exposure, excepting for biology or agriculture, will be suitable.

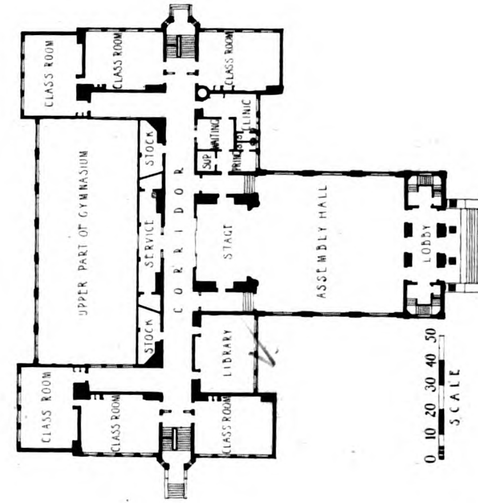
Drawing Rooms. These rooms are best located with a north exposure and a certain amount of skylighting, if of the north-facing, sawtooth variety, is permissible. Cases for drawing boards, paper, etc., are needed and facilities for exhibition of the pupils' work, together with a washbowl and a large sink, will often be found useful.

Auditorium, Gymnasium, etc. It seems now to be necessary to discuss these under one heading. The various attempts to combine the auditorium and gymnasium in one room have not met with much success and are gradually developing into the type of plan in which the gymnasium forms the actual stage, with a proscenium opening of 50 feet or so which may be closed by a more or less soundproof arrangement of doors, and which allows gymnasium exercises, standard basket ball, etc., to be carried on in full view of the audience. The auditorium has a sloping floor, and the stage-gymnasium will provide a place for the school dances. Some cities refuse to accept this idea, but in general there is a demand for larger stage accommodations and a tendency toward providing many of the appurtenances of a theater. Use of the school auditorium by the general public for community purposes is often demanded, especially in smaller cities, and it must be easy of access and provided with special entrances for the public. Location on the ground floor is of course essential, and it may be placed in the center of the building, or even in front if the locality seems to demand it. The deep stage causes a distinct acoustical problem, and the wide rear balcony which has more or less succeeded the narrow side balconies creates a cavernous space underneath which is always likely to be dark and stuffy. The auditorium of the future will probably be amphitheatrical in type, free from balconies and even located below the first floor level, while the passion for "elasticity" may even bring about a system of subdivisions into classroom spaces. The difficulty of making a large auditorium function as well acoustically with a few persons present rehearsing a school play or concert as with a packed audience must eventually affect its type and plan materially, so that I believe the school auditorium at present is in a transition stage between the theater and arena types.

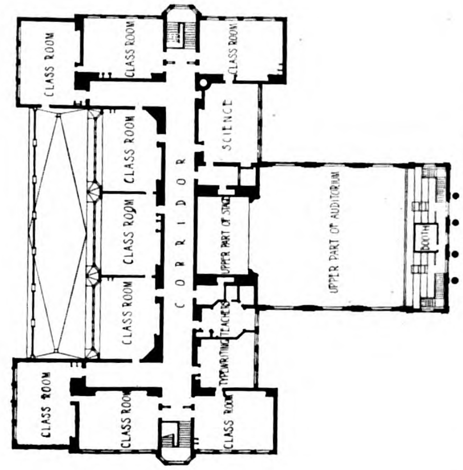
Another influence which affects the auditorium is the question of its adaptability for motion picture shows *vs.* concerts, theatricals, etc. The motion picture side favors a rather long and narrow room in which the spectators in no seats view the screen from too wide an angle, while for general purposes, and particularly for speaking, a wider and shallower hall is preferable.

The fixing of the proportion of seats in the auditorium to the desk seating capacity of the entire building is a question that ought to be regulated, since inexperienced committees in their enthusiasm sometimes make costly mistakes by too greatly increasing its size,—and architects, in their growing capacity of trusted advisers to building committees, will find that this question opens up a promising and useful field for research in the relation of plan to school administration.

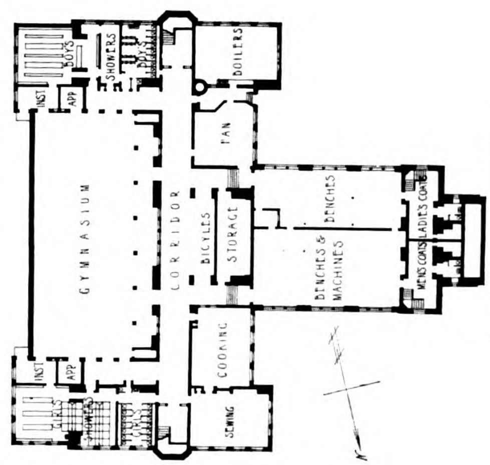




FIRST FLOOR PLAN



SECOND FLOOR PLAN



BASEMENT FLOOR PLAN

SOUTH JUNIOR HIGH SCHOOL, WALTHAM, MASS.

KILHAM, HOPKINS & GREELEY, ARCHITECTS

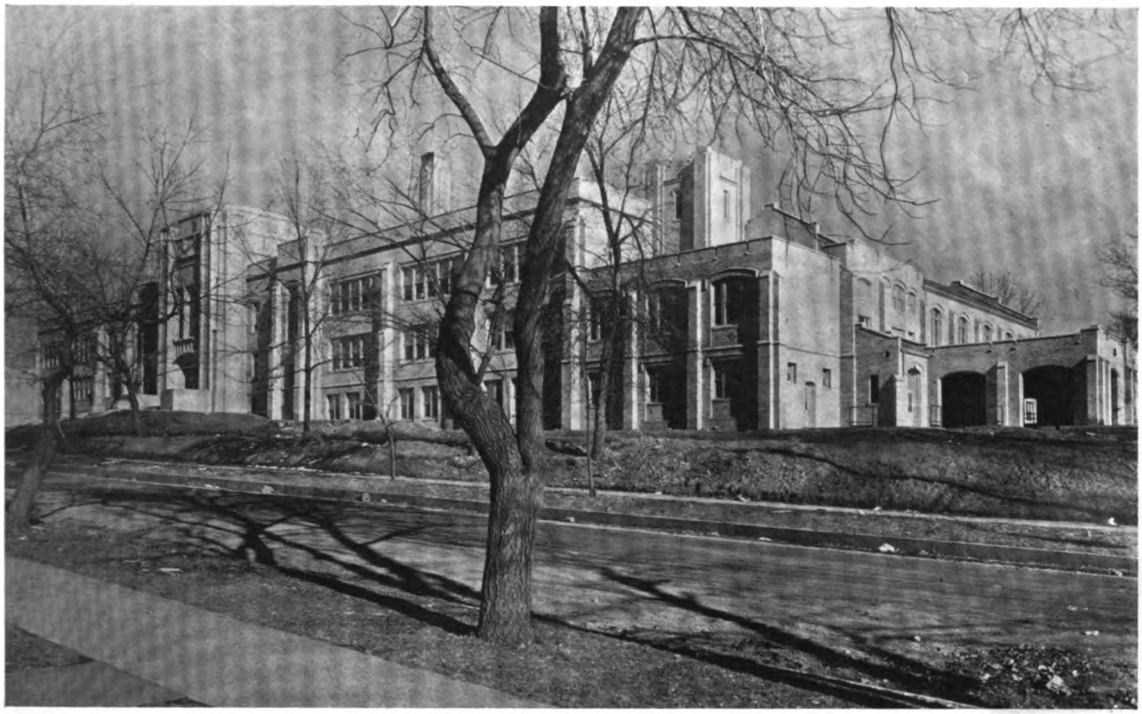
SOUTH JUNIOR HIGH SCHOOL
WALTHAM, MASS.

Illustrations on Plate 19

THIS school is now under construction at a cost of $256,000. It accommodates 640 pupils, making a building cost per pupil of $400.

The cubic foot cost is 32 cents.

The exterior of the building is of red water-struck brick and Indiana limestone. The construction is second class, with fireproof stairs and corridors.



GENERAL VIEW OF EXTERIOR

DETAIL OF ENTRANCE FRONT

WM. N. BYERS JUNIOR HIGH SCHOOL, DENVER

WM. N. BOWMAN CO., ARCHITECTS

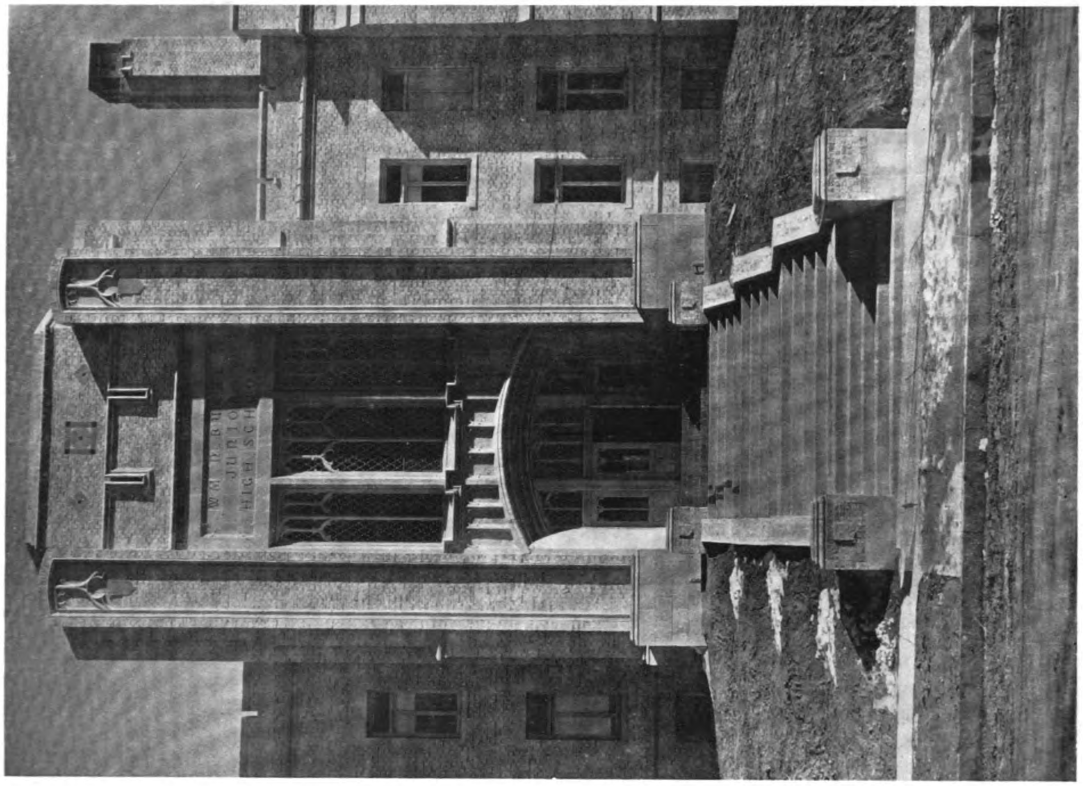
WM. N. BYERS JUNIOR HIGH SCHOOL
DENVER

Illustrations on Plate 20

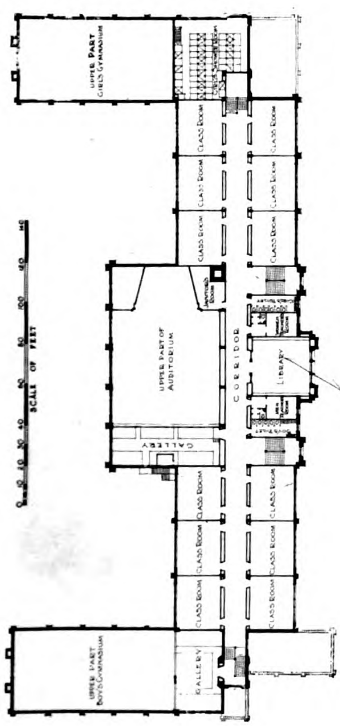
THIS high school was finished in September, 1921, at a cost of $540,000. It accommodates 1150 pupils, excluding equipment, making a building cost per pupil of $470.

The cost per cubic foot was 37 cents.

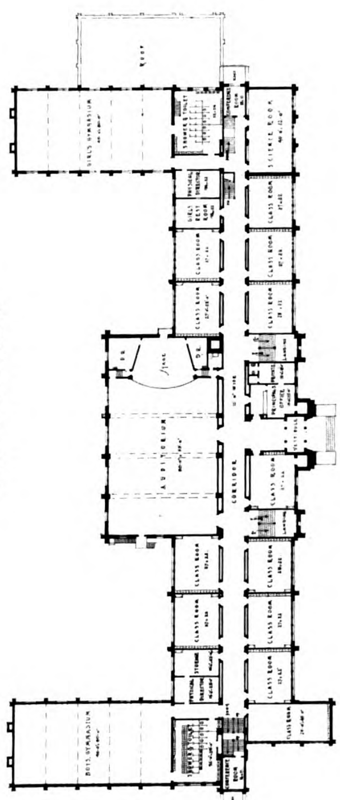
The exterior of the building is of light, rough textured brick trimmed in terra cotta. Construction is fireproof and mechanical ventilation is provided.



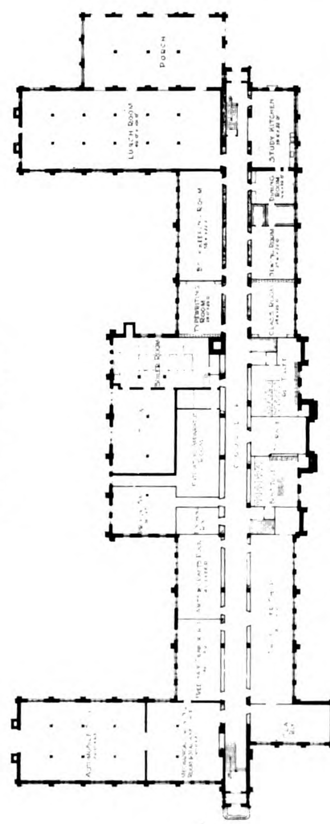
DETAIL OF ENTRANCE AND TOWER



SECOND FLOOR PLAN



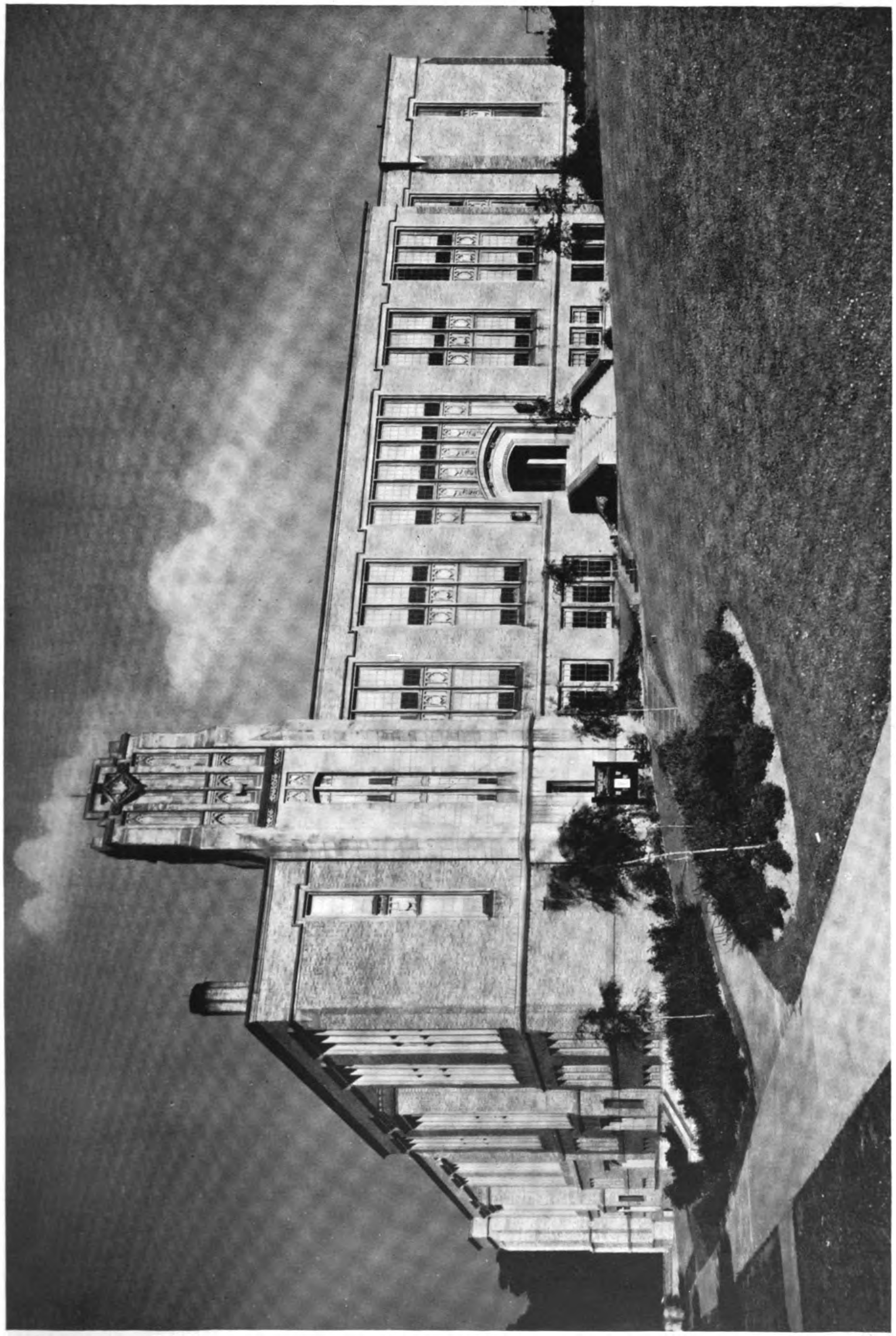
FIRST FLOOR PLAN



GROUND FLOOR PLAN

WM. N. BYERS JUNIOR HIGH SCHOOL, DENVER

WM. N. BOWMAN CO., ARCHITECTS



GENERAL EXTERIOR VIEW

COVENTRY ELEMENTARY SCHOOL, CLEVELAND HEIGHTS, OHIO

FRANZ C WARNER, ARCHITECT

COVENTRY ELEMENTARY SCHOOL, CLEVELAND HEIGHTS, OHIO

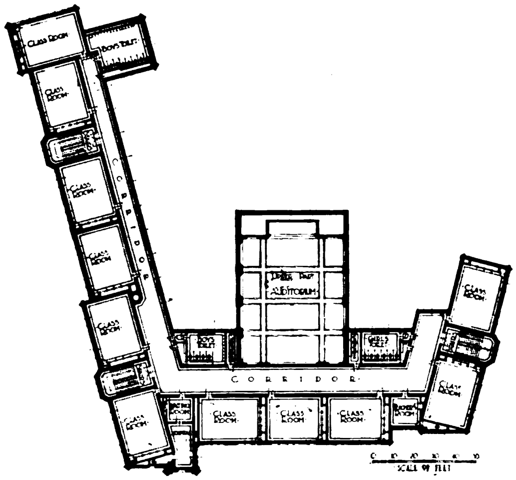
Illustrations on Plate 22

THE contract for the main building of this school was let in November, 1917, and the contract for the addition in January, 1921. The total cost of the building was $519,375. It accommodates 760 pupils, making a building cost per pupil of $683, including equipment.

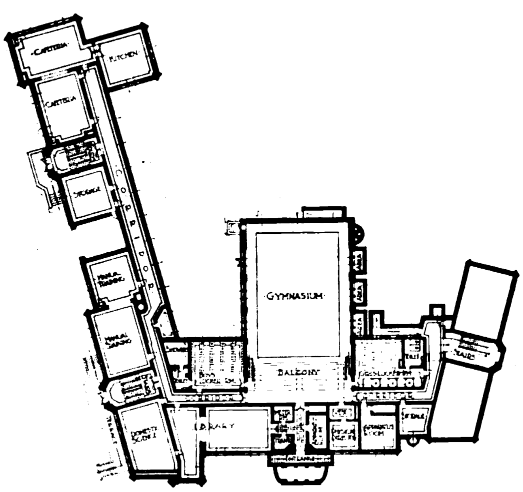
The cubic foot cost of the main building in 1917 was 33 cents and of the addition in 1921, 65.2 cents. The complete building averaged 42.4 cents.

The exterior is of salmon-buff face brick in mingled shades with sandstone trim. Construction is fireproof, with brick bearing walls, reinforced concrete and steel interior framing and concrete floors; composition roof with copper sheet metal.

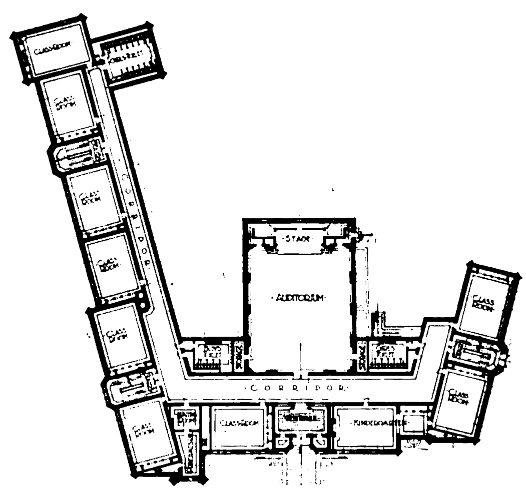
Separate heating and ventilating systems are provided for auditorium, gymnasium and schoolrooms, ventilating systems having both supply and exhaust fans.



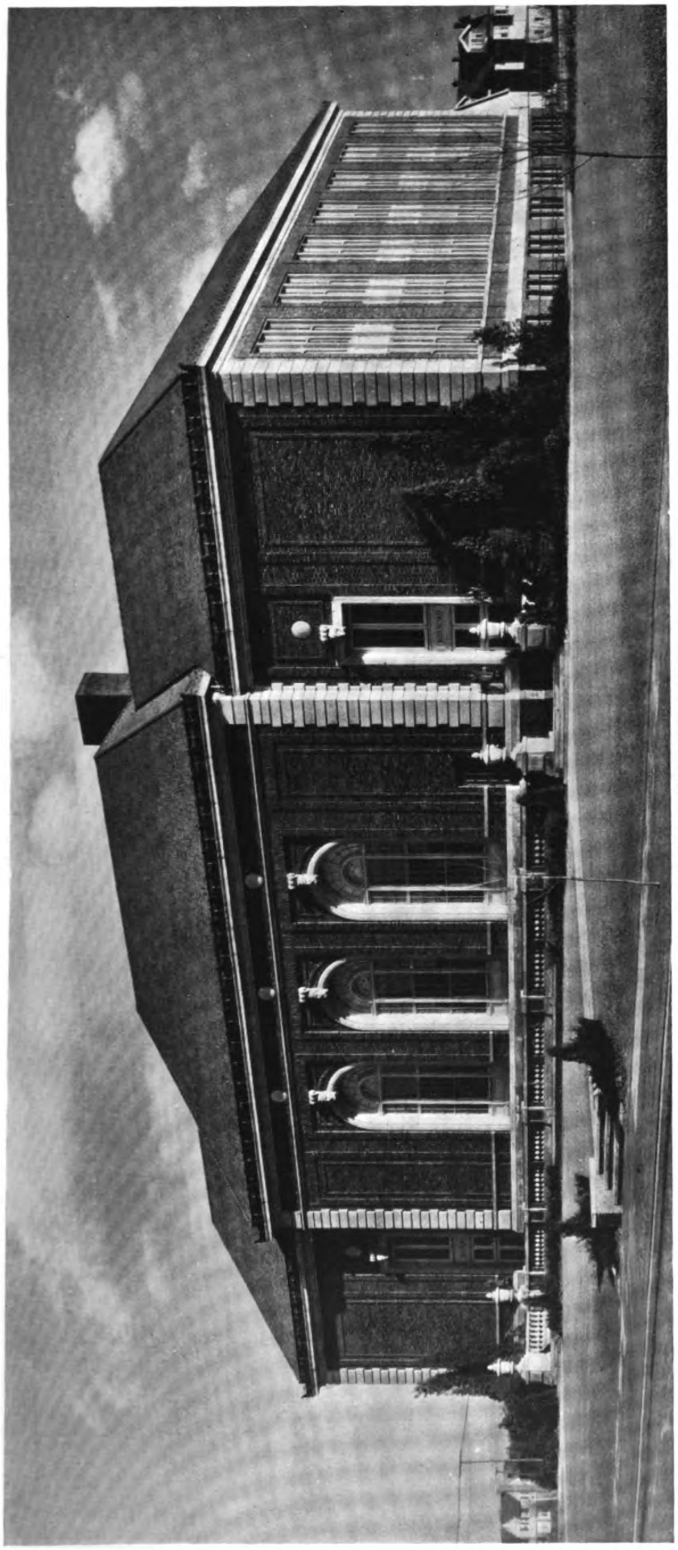
Second Floor Plan



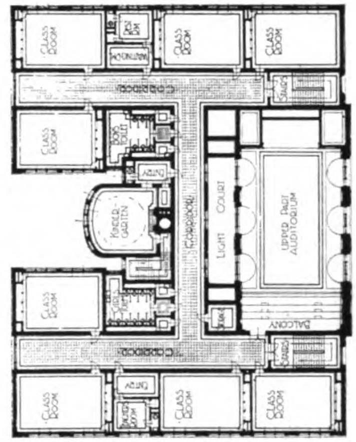
Basement Floor Plan



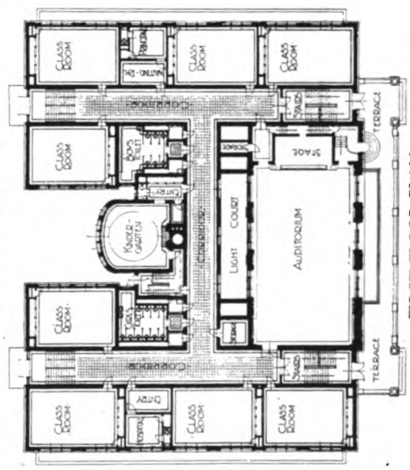
First Floor Plan



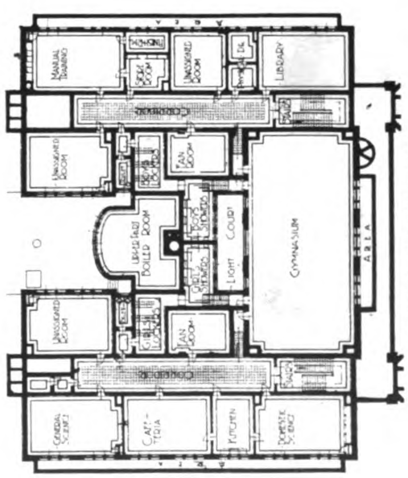
GENERAL EXTERIOR VIEW



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

ROXBORO ELEMENTARY SCHOOL, CLEVELAND HEIGHTS, OHIO

FRANZ C. WARNER, ARCHITECT

ROXBORO ELEMENTARY SCHOOL
CLEVELAND HEIGHTS, OHIO

Illustrations on Plate 23

THIS school was finished in 1920 at a cost of $494,000. It accommodates 630 pupils, making a building cost per pupil of $785, including equipment.

The cubic foot cost was 49.4 cents.

The exterior of this school is of dark red face brick in mingled shades, with sandstone trim; roof of tile with copper sheet metal work. The construction is fireproof.

The building is heated by the split steam system, with separate heating and ventilating systems for auditorium, gymnasium and classrooms.

Special Room Design and Equipment

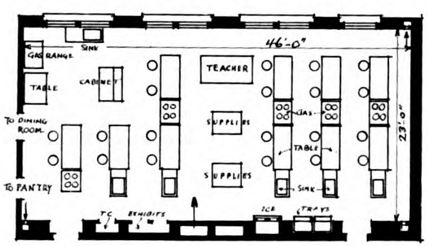
By JOSEPH C. LLEWELLYN, F.A.I.A.
Joseph C. Llewellyn Co., Architects, Chicago

IN all high school buildings special lines are taught for which special floor arrangements and equipment must be provided. These comprise home economics, industrial arts, general science, biology and agriculture, physics and chemistry, and the commercial branches. Add to these departments physical education with its attendant games and contests, and we have one of the chief reasons for the rapid growth in recent years in numbers of pupils and the increase in space requirements.

Planning for an average school, we must keep in mind the fact that schools grow and that one department may grow faster than another, that one study in a group of what may be kindred studies may have more students than another, and that this element of growth must be provided for. An aid to caring for this sometimes unequal growth is found in grouping kindred studies, requiring much the same equipment and space, in the same part of the building so that the rooms can be used interchangeably and extra class periods provided for by using the vacant periods in any of the rooms similarly arranged and equipped for classes in other branches. A further aid to expansion is by grouping the rooms so that new rooms in extensions to the buildings can be grouped with existing departments.

The character of the community in which the school is located will have an effect on the number and type of rooms provided for special branches; the architect, in planning his building, should know the character of the population supporting the school and adapt his building to the needs of the community. For this information the architect has to depend largely on the superintendent of schools and, as far as permitted, upon the heads of the departments. A wideawake superintendent will call upon his department heads for suggestions as to plans and the conduct of their departments. In all cases, however, it is essential to keep in mind the ultimate growth of the school and plan for extensions, as well as to arrange for later installation of equipment wanted but not possible at first. Hence the wisdom of planning first for essentials with allowance for growth, and also provision for still larger growth by later additions.

Taking the departments in the order named, the first is the home economics group—cooking, sewing, millinery, housekeeping and laundering. Cooking and sewing are often the only branches taught at first, while in many schools all are installed. The cooking room is arranged on the unit plan, giving to each four pupils two standard tables, one gas stove with four burners and oven, and a sink with drainboard. Two detached tables with sink and stove form a fifth group. A sixth unit is arranged as a home kitchen with cabinet, sink, range and table. The teacher's desk and supply tables are located in the center of the room. A refrigerator, laundry tubs, teacher's case, and storage or exhibit cases are built within the body of corridor walls or elsewhere. The arrangement is as shown by the sketch plan of the Benjamin Bosse High School, Evansville, Indiana, and reference to illustrations of rooms in earlier schools will show the change from hollow square to detached units in cooking room arrangement within a very few years,—the unit ar-



Plan of Modern Domestic Science Room

Intermediate Type in Evolution from Hollow Square
Senior High School, Benton Harbor, Mich.

Modern Domestic Science Room Arrangement
Junior High School, Beloit, Wis.

Joseph C. Llewellyn Co., Architects

rangement now being in favor. A practice dining room with china and storage pantries is grouped with this cooking room. A living room, bedroom and bath, grouped with the dining room and kitchen of the cooking room, would give opportunity to illustrate and practice other branches of housekeeping.

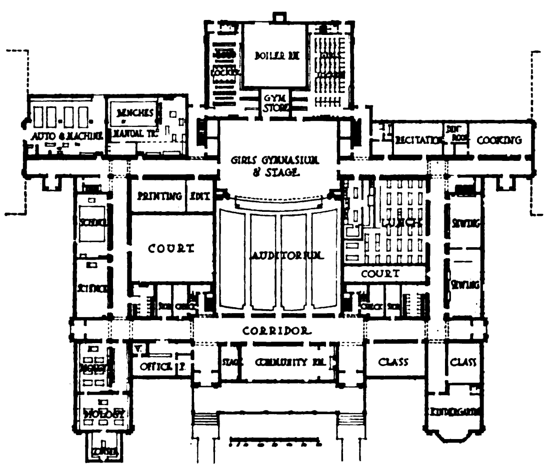
The sewing room is arranged for 24 pupils, all facing one way with light to the left. Teacher's desk and supply and work case are at the front of the room. Sewing machines are arranged along outside wall, and ironing boards at the rear. Tables will accommodate the work of three classes. Provision for extra pupils is provided by cases within the wall or in the case at the front of the room. A large cutting table with drawers for materials gives added provision for work and storage. The fitting room, often built in, gives way to an alcove screened in by the three-part mirror which is set aside when not needed. A second sewing room can be used for classes in millinery as well as for sewing, or it can be used as a classroom until such time as it is needed for sewing.

The lunch room is an important element in the modern school. In smaller schools the lunch room is sometimes managed by the domestic science department, in which case it should be grouped with the cooking department. The school will soon outgrow this arrangement, however, and the lunch room will become a separate unit as far as management is concerned. The scheme of school administration has a bearing on the size of the lunch room. With a two-session day growing in favor in some sections, a large proportion of the pupils go home for lunch and a much smaller floor space will be necessary than in case of the school operating on the single-session plan where all pupils have lunch in the school building. In either case, the floor space necessary to care for all pupils lunching in the building, in not more than three shifts, is the minimum.

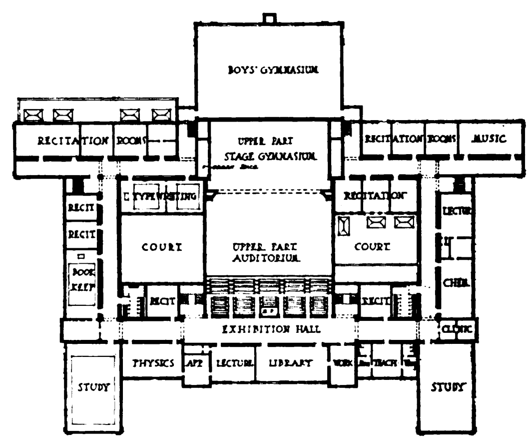
The arrangement will vary for various schools, ranging from the open kitchen and counter in smaller schools to detached and more completely equipped kitchens, with counter only in the lunch room proper, in the larger schools. Kitchen equipment will include ranges, bake oven, steamer, cook's table, vegetable parer, dish-washer and refrigerator. Ventilation of kitchen and lunch rooms should be by exhaust fans. Large kitchens will be similar, with larger units or a duplication of units. The serving counter will contain places for trays, silver, steam table, ice cream, milk cabinet and coffee urns, and the intervening spaces for bread, pastries, etc.—the under portion of the counter, to within 8 inches of the floor being shelved for dishes or other uses.

The equipment for kitchens and lunch rooms, including counters and tables, has been quite thoroughly standardized by houses specializing in this equipment; they use non-absorbent materials in the construction of tables and counters which are difficult to obtain from other dealers. With equipment determined upon, sewer, water, gas and electrical connections properly located must be provided. Impervious floors and walls permitting of frequent flushing or washing are essential in lunch rooms and kitchens, and proper drainage must be provided for this purpose. For table tops, satisfactory use is made by different schools of glass, enameled steel, linoleum glued down to wood base and bordered with neatly fitted hardwood, or wood well finished with waterproof varnish.

The first requirement in an industrial arts department is the woodworking shop. In the upper grades or junior high schools the equipment is often limited to the woodworking benches for the class, variety saw for cutting up of material, and provisions for gluing up of work, the rest of the operations being done by hand. In larger schools the bench room is supplemented by machinery and the work is more advanced. The efficiency of any shop is not in the number of machines installed but in the selection and proper placing of machines so as to give ample floor



First Floor Plan



Second Floor Plan

Benjamin Bosse High School, Evansville, Ind.

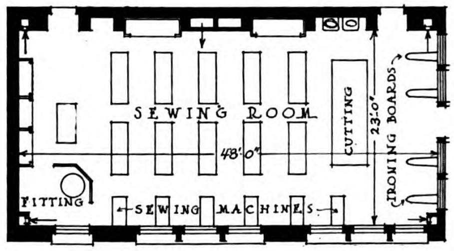
Joseph C. Llewellyn Co., Architects

space for their operation and a logical sequence to the steps in the process of work. As a basis for the woodworking machine room, this equipment will prove adequate excepting in very large schools or trade schools:

1 24-in. surfacer.
1 16-in. jointer.
1 14-in. variety saw, if mortising and tenoning attachments are desired, or a universal saw if without these attachments.
1 30-in. band saw.

Students' turning lathes as necessary to care for the classes, and possibly a 6-in. pattern-making lathe, all to be located so as to give unobstructed floor space for their operation.

A grinder with two oil stone wheels, with cone and emery wheel and leather strapping wheel, should be placed where convenient to both machine shop and bench room.



Sewing Room Plan for 24 pupils

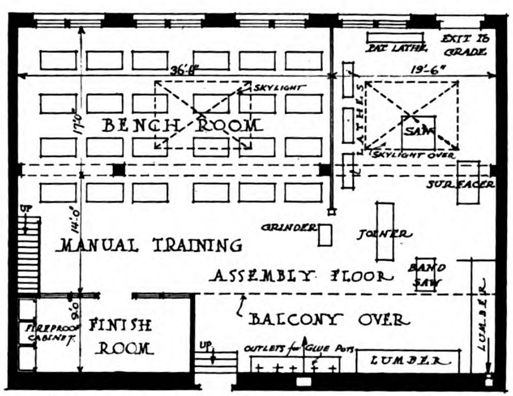
Any extension in space and in machines should be carefully considered and had only when needed to fit in with a well thought out plan of operation; it may include mortising and tenoning machines, sanders, additional jointers, the whole thought being to furnish only what will fit in with the actual need of the school as developed.

For the bench room, single benches for the class unit are preferable, placed with reference to getting the best lighting for the work. Floor space for the erection and storage of articles under construction is necessary, and a glue bench with an electric or gas glue pot is required. A finishing room, enclosed, and provided with a fireproof storage room or steel cabinet for storing of paints or varnishes will complete the requirements for a woodworking shop. Additional floor space for temporary storing of completed work can be obtained by building a balcony, as indicated on the plan. In the layout of shops the principal thing, as already said, is to have floor space for the various operations. We much prefer to work out the arrangement, both as to the number and disposition of machines and other equipment, with the instructor who will have charge.

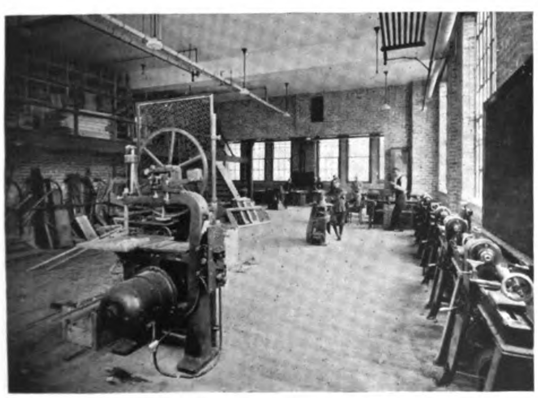
The machine shop in the average school appears to be giving way to a combination auto and machine shop where the study of automobile construction and repair, involving machine operations, will constitute the training in this branch. For this work plenty of space is necessary rather than a large equipment. A shop equipped with these machines will be found to meet most requirements:

1 6-ft. lathe, 14-in. swing.
1 hydraulic or hand-power press.
1 portable forge, hand-power. with anvil and tools, or this can be equipped with motor plugged into a wall receptacle.
1 grinder with bench tools, vises, etc., as necessary.
1 drill.

Extension of the machine shop for more varied work will depend upon the school and the direction of its growth. Machines probably added would be a shaper, a milling machine, larger lathes, and a

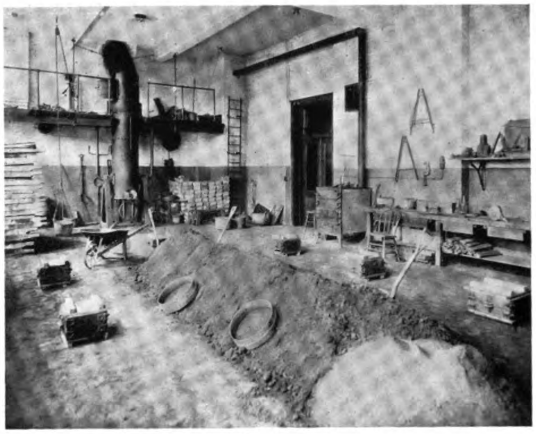


Bench and Wood Machinery Work Combined in One Room

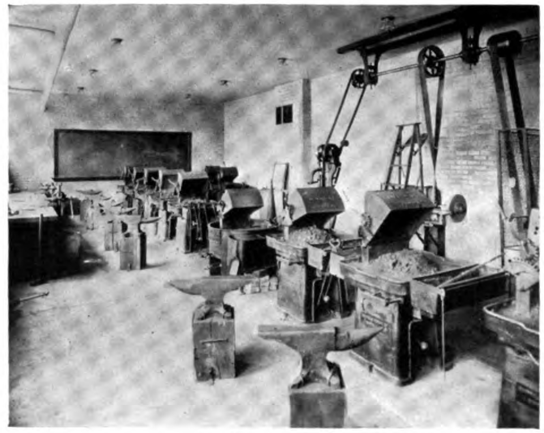

Woodworking Machinery Room
Deerfield-Shields Township High School


Bench Room with Small Machine Equipment
Hixon Annex, High School, La Crosse, Wis.

Joseph C. Llewellyn Co., Architects



Foundry



Forge Room

Hixon Annex, High School, La Crosse, Wis.
Joseph C. Llewellyn Co., Architects

planer—sizes and types depending on conditions.

Foundry and forge rooms, when wanted, will include this basic equipment:

For the foundry:

Cupola (½-ton capacity or larger as required) equipped with blower.
Moulding floor.
Moulding benches.
Flasks.
Core oven.
Brass furnace.

Where the foundry is included, pattern making can be added to the work of the woodworking department.

For the forge room:

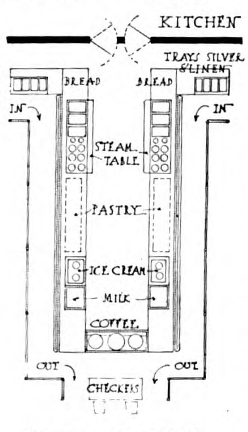
Forges in the number desired, connected by underground piping to a blower and also to an exhaust fan.

To the forges can be added:

Small power hammer.
Shear and punch.
Drill press.
Grinder.

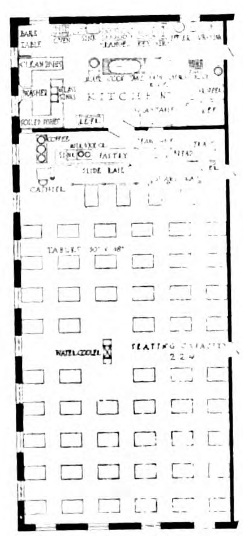
These, with anvils and tools, and bench with vise and hand tool equipment, will complete what is absolutely necessary in the forge room. In all shops the element of safety has to be considered. Requirements are quite thoroughly covered by state regulations, and many of the machines are now manufactured so as to care for this feature quite within the construction of the machine itself. The individual drive of machines by motors eliminates practically all of the danger due to belt-driven machinery and is rapidly growing in favor.

For the science group, the room requirements must give space for tables for a class not to exceed 24 pupils. In this group we place general science, biology, agriculture, physics and chemistry. The room for general science requires only a demonstration table with sink and an extra sink at the wall. The pupils in this branch perform no individual experiments. A stone shelf, secured to the outer wall under the windows and equipped with water, small hosecock, and waste connections, and provided with gas and electric outlets for use if desired, will afford opportunity for placing aquaria or other propagating appliances and for other uses, and adds a degree of flexibility to the

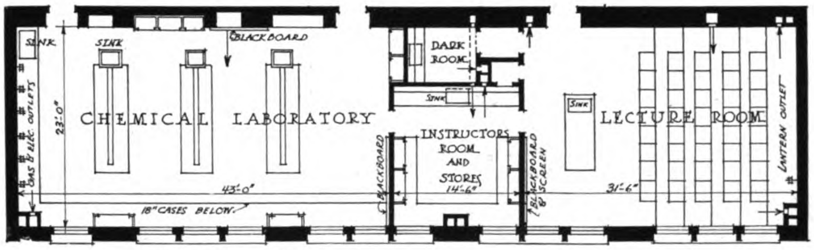


Detail Layout of Double Service Counter

Cafeteria, Academic Building, Berkeley High School, Berkeley, Calif.
William C. Hays, Architect; A. Appleton and Joseph J. Rankin, Associates



Kitchen and Cafeteria Plan for 224 pupils



Plan of Chemical Laboratory, Lecture Room and Instructor's Office

room which is desirable.

For biology, agriculture, physics and chemistry lecture rooms, tables similar to that used in the general science room, but larger, will be required, fitted with water, sink, and connections for gas and electricity. For biology the tables—for four students each—are often plain tables, but tables built with drawers to care for students' work (three or four sections) will avoid necessity of having that much wall case space and are preferable. A wall shelf with water, waste, gas and electric connections also adds to the capacity of the room. The biology rooms should also be equipped with ample storage capacity in the way of shelves and cases for specimens, charts, records of students' work, etc. A conservatory for plants and an aquarium adjoining the biology laboratory will complete the equipment that will be found to meet most requirements. Where more is required, the equipment should be placed in compliance with the demands and program worked out for each individual school.

Natural Science Room, Junior High School, Beloit, Wis.
Joseph C. Llewellyn Co., Architects

The agricultural laboratory will be fitted in much the same way, any variations depending upon the special work which it is designed to do. Special tables will be wanted if milk-testing and similar operations are made a part of the course, as in some schools. Also special bins for the storage of various soils, sand, etc. In this laboratory as well, the wall shelf will be found advantageous.

For physics and chemistry, special tables for classes not to exceed 24 pupils will be needed, supplemented by wall shelves and fitted with plugs for gas and electric current. A fume hood will be required in the chemistry laboratory, and a smaller fume hood is often of advantage in the instructor's office and lecture room as well. With the exhaust on these hoods and from the chemical laboratory room, the ventilation is apt to be more positive and better than with individual fume exhausts over chemistry tables, piped with the small piping connections ordinarily used.

For chemistry and physics, lecture rooms are required. In addition to the demonstrator's table just mentioned, these rooms must also have provision for use of stereopticon, electric outlet and screen, and provision for darkening rooms. As already explained, the connection with the small fume hood near the demonstrator's table in the chemical lecture room will be of advantage. For these rooms also the students' seats should be banked.

Between physics and chemistry laboratories and their lecture rooms, we place the instructor's rooms with storage for supplies and apparatus and, adjoining these, darkrooms for each laboratory as well. The darkroom for the physics laboratory can be large, as indicated on the plan, and will afford a place for experimenting in light that is desirable at times. In the physics instructor's room also, there may be space for installation of radio equipment, and permanent standards for aerials and means of bringing down the wires through the construction of the building through fiber conduit should be installed on buildings, thus giving opportunity to install radio apparatus whenever desired. For chemistry tables, the bottle rack, common in former times, is disappearing and the supplies for students are placed in wall cases easy of access. Storage cases also for extra supplies are provided in storerooms, but other cases can be placed in the corridor walls if desired. No part of the planning of schools is capable of more variation in arrangement and equipment than these rooms for special study, in which the requirements are increasing as the studies progress. Hence the need for working with all school administrations, apparatus and supply people in order to anticipate, as far as possible, future requirements.

The development of physical education in school activities has been rapid. In schools of average size, one gymnasium for both boys and girls is often sufficient. In larger schools, separate gymnasiums should be provided for boys and girls. The element of contests in athletics has caused the increasing of the floor requirements very greatly in that seating accommodations for hundreds of spectators are required. A means of supplying this accommodation in an economical way is offered in the combination stage-gymnasium, seen in the arrangement of sev-

Swimming Pool, Hixon Annex, High School, La Crosse, Wis.
Note drain in floor to tile overflow of pool
Joseph C. Llewellyn Co., Architects

eral recent schools. A stage large enough for gymnasium work and to stage a basket ball game or class calisthenics or capable of being set for dramatics, has for the seating of spectators the whole auditorium. The arrangement has some disadvantages, but the evidence of those who have used buildings of this type is generally in favor of it. A means will have to be devised for shutting off the auditorium from the stage or gymnasium in a way approaching soundproofness in order that gymnasium and auditorium can be used simultaneously. Some methods have been devised which are extremely cumbersome and expensive. Collapsible doors, hung in pairs, furnish the best means thus far, and the best results will probably come from improvement in construction and joining in these doors.

In the Benjamin Bosse High School, two gymnasiums were desirable, but at first seemed out of reach. A gymnasium 64 x 100 is provided for boys, which is intended for regular work of the school only. For the girls, the stage-gymnasium—already referred to—will be used, and all contests for both boys and girls will be staged here. The stage is deep enough in case at any time it is desired to set the scene for a play and leave it for a time, and still provide floor space for the girls to do their regular gymnasium work.

Locker rooms for both boys and girls open to the stage and also to the athletic field or playground. Provision is made for dressing rooms in girls' shower room and full size lockers in boys' shower room for classes of approximately 50 each. The rest of the space for lockers, not occupied by showers, is given to cubicals or small lockers, each fitted with a wire basket for holding gymnasium suits. In the locker rooms also are provided lavatories, mirrors, comb and brush shelves and, for the girls especially, electric connections for the installation of hair dryers.

The instructors in physical education for boys and girls are given a suite of offices adjacent to their respective gymnasiums. The arrangements can be varied with the size and needs of the school, but in general there should be provided an outer office and inner office, a workroom, and shower. For the instructor for boys, a storage room for special apparatus or athletic supplies is desirable.

The equipment of the gymnasium is something that can be carried on by degrees and which will vary according to the methods and plans of the athletic directors. As a preliminary to this planning, this equipment will constitute a good beginning:

1. A vaulting bar attached, swinging back to the wall.
2. Wall ladder.
3. 3-section stall bars.
4. Suspended ropes and poles.
5. Flying rings and traveling rings and the mats to meet the equipment requirements.
6. An outfit of Indian clubs, dumb-bells and wands, with the required racks for storage.
7. Volley ball and basket ball outfits.

For the larger schools, a horse, parallel bars, pulley weights if wanted, spring board for jumping, jumping standards and additional mats can be had, with such other equipment as the special work of the gymnasium may suggest.

Boys' Gymnasium, Deerfield-Shields Township High School
Joseph C. Llewellyn Co., Architects

Recent Developments in the Detroit School System

THE necessity of making intensive use of all available school space in Detroit, for a rapidly increasing number of children of school age, led to the adoption of a school administration system of the "platoon" type which has in late months been receiving careful study by school authorities from many parts of the country. It was seen to be necessary that classrooms be made to provide for more than one set of pupils and that the idea of individual, permanent desk and seat be abandoned. To dovetail into this plan was the well recognized importance of varying the work of the school day, and as finally worked out the "platoon system" provides for two entirely separate sets of pupils, one set using the classrooms while the others are engaged with other school work, this latter set using the classrooms when the first set has begun its out-of-classroom session. The intermediate school consists of six 60-minute periods, with an hour for lunch. Each period provides both the recitation and the study activities under the teacher who gives instruction in the subject. Every one of the boys and girls takes an hour daily for exercise and shower bath. An auditorium is in use each period. From 70 to 200 or 300 students assemble each period to listen to lectures on social and civic affairs.

Of course to care properly for the needs of a school organized upon this principle the building must provide, in addition to the usual classrooms, an auditorium, library, gymnasium, nature study room with conservatory, and also indoor play space, to be used by the children in bad weather when the playground is not available. These requirements have necessitated the enlargement or remodeling of a number of existing school buildings.

In developing school buildings to be used for this form of operation the Detroit schools are arranged upon what might be called the 24-section type as being the most effective. A school of this type contains 24 sections accommodating 40 pupils each, or a total of 960 plus 120 in the kindergarten. In planning a new building the school program is first made up, and decision is reached as to exactly how many student hours of instruction the building must take care of. A structure is then erected to definitely fit the requirements, and upon the day the building becomes available the school program and organization are ready to function. During the past two or three years Detroit has erected about 40 auditoriums and gymnasiums as additions to existing buildings and has also built 9 entirely new schools. There are now in operation 44 "platoon" schools, enrolling about 40,000 pupils, and other buildings now being erected will make a total of 51 ready for use in September.

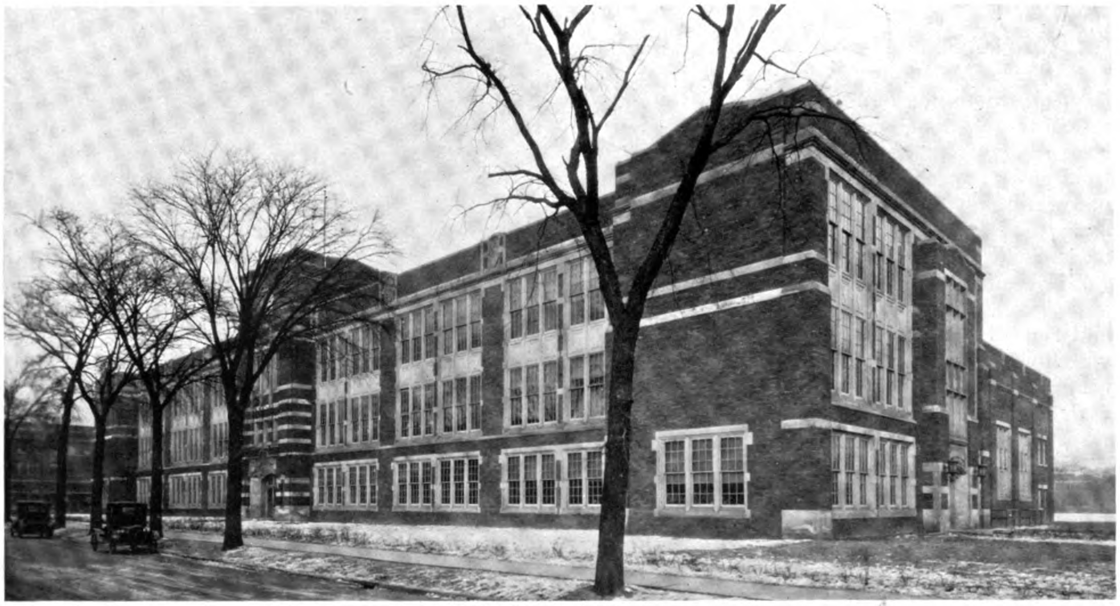
For successful ventilation it is necessary that the air be evenly distributed to avoid excess in ventilation at some points and to give the required amount in others. The ventilation of the recent Detroit schools is done by the projection system, by which the air is distributed by virtue of its velocity where it is needed. They had used ceiling outlets for air delivery many years ago, and it was decided to come back to this system in an improved way provided the architects could solve the problem of installation of proper ducts in the fireproof buildings. The co-operation of the architects in using the steel pan type of concrete floor construction simplified the problem, making it possible to utilize the void spaces between the concrete floor joists for ducts, these being laid out for the proper locations.

The system as worked out has proved very simple and inexpensive. This was made possible partly by the fact that the Board of Education has started to build schools without basement classrooms, Detroit being one of the last of the large cities to adopt this policy. It is therefore possible to utilize a basement corridor under the first floor corridor as a large distributing plenum chamber for tempered air. This chamber is made of sufficient height for one to walk through and is equipped with hose connections and floor drains so that it can be easily washed down and kept sanitary. It also serves as a space for carrying steam and return lines, electric conduits, etc. The results obtained from Detroit's latest system with ceiling distribution of air have proved very satisfactory, not only as to first cost, but in the efficiency and uniformity of air distribution. The systems are planned for 30 cubic feet of fresh air per minute, but it is expected to cut this to 20 and possibly to 15 feet per minute.

Library of Levi T. Barbour Intermediate School, Detroit
An essential feature of the "Platoon System"
Malcomson, Higginbotham & Palmer, Architects

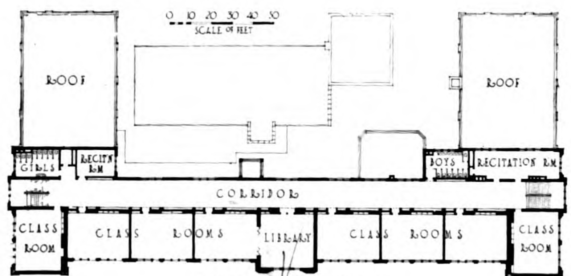
George M. Balch Intermediate School, Detroit

MALCOMSON, HIGGINBOTHAM & PALMER, ARCHITECTS

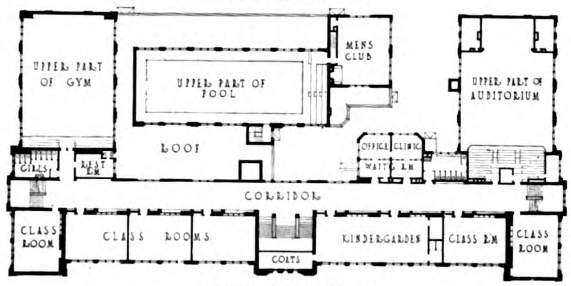


GENERAL VIEW OF MAIN FACADE

THIS is one of the recent Detroit schools to be planned for operation on the "platoon system." It is of fireproof construction, with concrete and hollow tile floors. The exterior is of mingled shades of mat face brick with Indiana limestone trimmings. The building accommodates 1,080 pupils and was erected in 1920, when the cost of building was at its height, for $608 per pupil, or 55½ cents per cubic foot. The heating and ventilating are provided in the manner described on the preceding page.

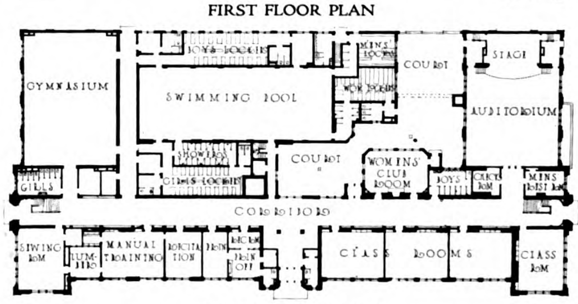


SECOND FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF MAIN ENTRANCE



GROUND FLOOR PLAN

Community Features of the Modern School

By DWIGHT H. PERKINS, F. A. I. A.
Perkins, Fellows & Hamilton, Architects, Chicago

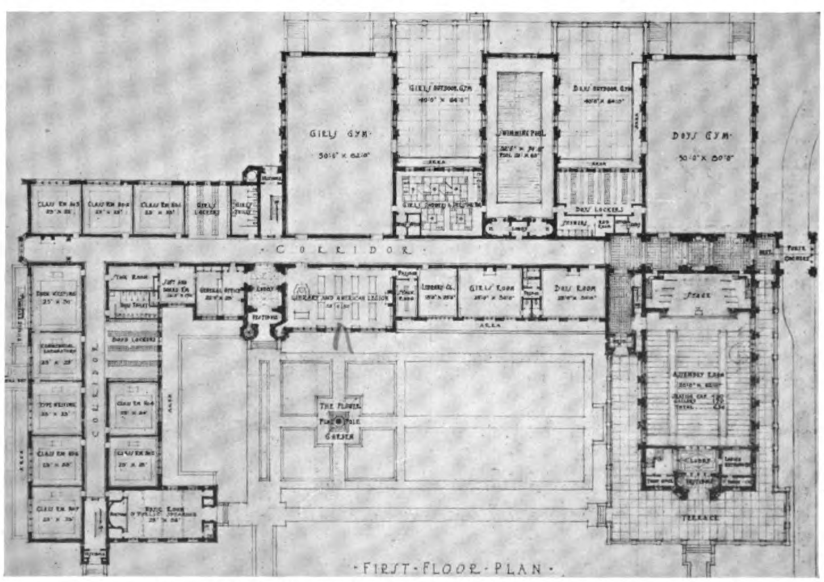
IN the modern public school building the neighborhood has the most effective means of centering and developing community life. In recent years, this has caused much study to be given to the design of these buildings in order to arrange them for the most satisfactory use for such purposes. The features of the school which are most in demand for this use are the auditorium, the gymnasium, the library, the natatorium, shops, and the domestic science cooking rooms or other provision for serving refreshments.

The use of these facilities is a subject of many phases and constantly changing aspects. It differs as the community use grows and expands in its character. Formerly we thought of community use merely as a gathering of citizens in the auditorium for entertainment or lecture purposes; now we regard it as incorporating the educational and recreational activities of every resident of the district. All classes in the community may come to the school outside of school hours for physical training and for group meetings, for use of the natatorium and for enjoyment of the athletic field, either as spectators or performers. A "school," now, in order to be complete, must include grounds, a field, and out-of-door facilities as well as a building with various rooms and equipment.

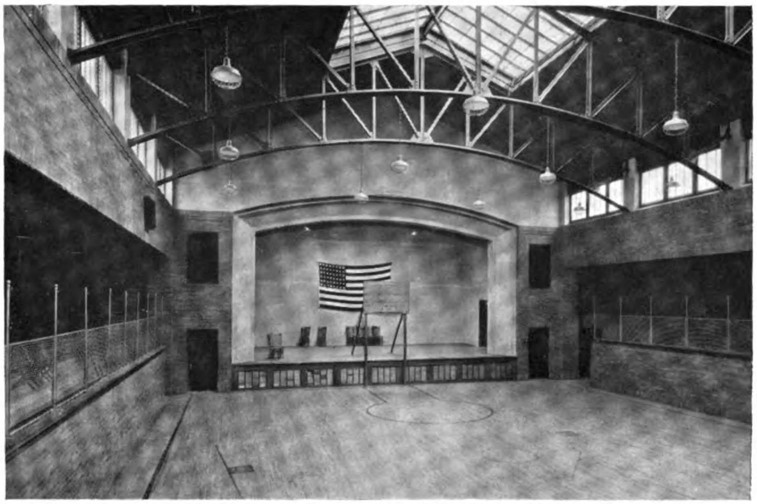
The community is beginning to use the school for women's clubs and men's clubs, library reference, forums, reading and study circles in groups of from 20 to 50, and they use either the library or large classrooms or study halls or rooms which have been provided for public speaking and instruction in music. It is, therefore, impracticable to discuss the phase of this subject which has been given me without overlapping and taking up almost every feature of a modern school plan. As other contributors to this symposium will cover such features, it will suffice to explain under this heading that community facilities are very largely a matter of program and arrangement, a matter of suggestion and invitation by the board of education and the officials of the school on one hand, and response and receptivity by the publicon the other. When it is suggested to a progressive administration to offer the use of the school plant to its owner, the public, for such purposes, and when this offer is met by desire and acceptance by the public, it is usually found necessary to organize and operate continuously an active agency for the promotion of community activities of all varieties and to arrange and carry out programs for amusement, recreation and social functions as well as public education.

Another contributor to this symposium will discuss gymnasiums; I shall simply direct attention to two problems which have a community bearing and which relate to gymnasiums. One is the changing order in gymnastic work from individual drill to competitive team athletics. This latter development involves to an increasing degree the presence of spectators, and the whole results in an almost complete elimination of fixed gymnastic apparatus. Floors are left clear for competitive athletics, and the demand for spectators' space necessitates from 300 to 1,500 seats. Compliance with this demand is clearly a provision for community use. The public must be accommodated. Admission fees must be collected, and the galleries must be warmed and at least partially ventilated by mechanical methods. Of course, they must be rendered free from danger from fire or panic, so that in this feature many of the elements of an auditorium are required.

The second community feature relating to gymnasiums is generally temporary. Frequently on account of restricted funds schools must for a time use gymnasiums for auditorium purposes. If large



First Floor Plan of High School and Community Building, Bernard Township, N. J.
A complete development of community facilities
Guilbert & Betelle, Architects

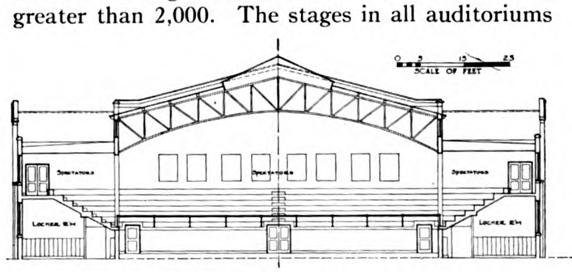


Combined Auditorium-Gymnasium, Elmer R. Webster School, Pontiac, Mich.
Perkins, Fellows & Hamilton, Architects

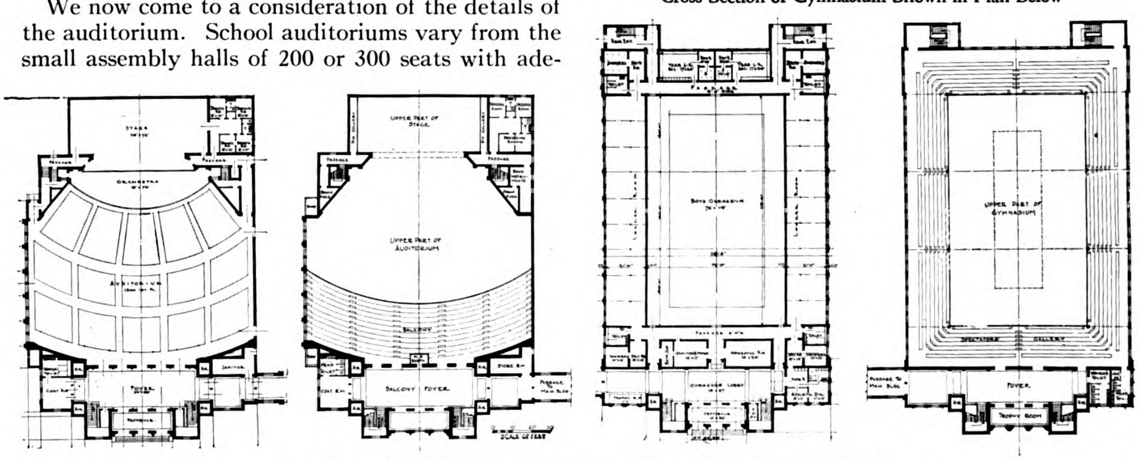
provision is made for spectators, this provision with the playing floor covered with portable chairs gives adequate capacity of seating though, of course, the flat floor is not so good as the banked floor for auditorium purposes. Such a gymnasium is shown by illustrations included with this text. It is next to impossible to make an adequate stage for auditorium purposes in a gymnasium, and this feature is, therefore, supplied by a temporary platform occupying a part of the playing floor and separated therefrom by curtains. Even for temporary use, proper provisions for safety and for free and easy access and exit must be made. A combination auditorium-gymnasium, permanent in character, is shown by the illustration of the Elmer R. Webster gymnasium, Pontiac, Mich. This does not, however, conform to the curriculum most frequently adopted, which generally requires simultaneous use of the gymnasium and auditorium.

We now come to a consideration of the details of the auditorium. School auditoriums vary from the small assembly halls of 200 or 300 seats with adequate stages for dramatic purposes, or the hall of 500-capacity such as is being developed in Detroit with reference to the platoon plan, to the large high school auditorium of 1,000 to 2,000 seats. Although large auditoriums where 4,000 or 5,000 people may be seated have been built for theaters, it can be safely approximated for schools that the range, the carrying distance of the ordinary unprofessional speaker's voice, is not over 120 feet. Under the best arrangements it is not safe to assume that an ordinary speaker can be heard by all of the hearers if some are placed more than 120 feet distant from the front of the platform, and 100 feet is better. This makes a preferable limitation of 2,000 seats, and even then involves the use of a balcony.

We illustrate these points by a sketch of an auditorium for a school which will ultimately have an attendance of between 3,000 and 4,000 pupils. It has been regarded by some authorities as inadvisable to attempt to provide seats for all of the students in a high school when the attendance is greater than 2,000. The stages in all auditoriums

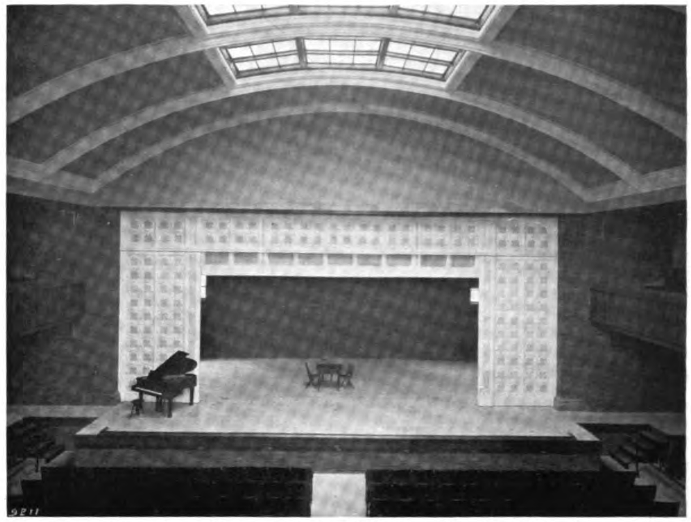


Cross Section of Gymnasium Shown in Plan Below



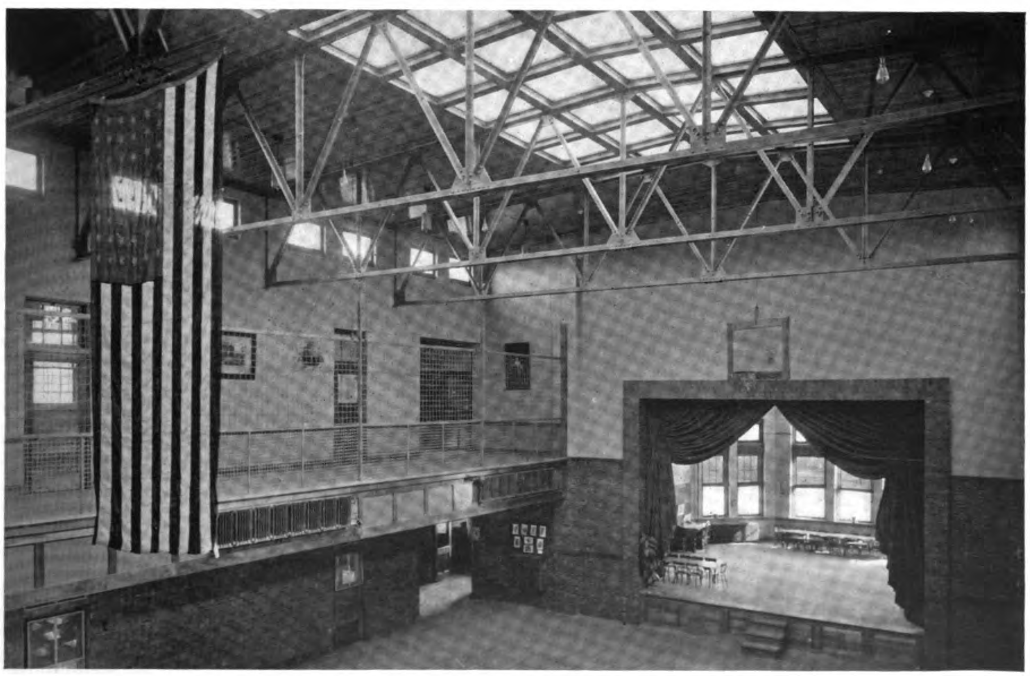
Floor Plans of Auditorium and Gymnasium Wings of School for 3,500 Pupils
These units are arranged for both school and public use
Perkins, Fellows & Hamilton, Architects

should be so designed that these activities may be provided for: lectures, concerts, moving picture and stereopticon shows, orchestra concerts, band concerts, operas, plays, pageants, graduation exercises, athletic or calisthenic exhibitions; in short, any or all kinds of shows. Such a stage must have an opening capable of expansion and reduction. The maximum width of proscenium opening desired for theater or dramatic productions is 24 to 30 feet, but for gymnastic exhibitions or for graduation purposes the opening must be much greater, and provision must be made for these widely different demands. One solution of this problem is indicated by the illustration of the New Trier auditorium stage included herewith.



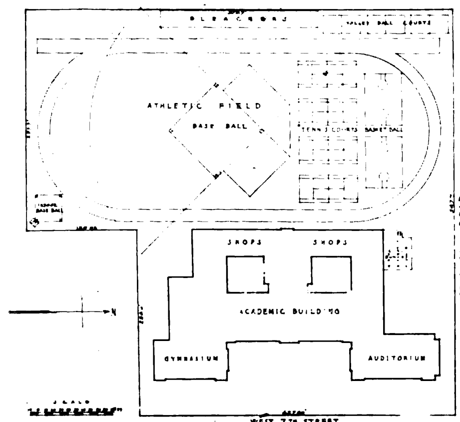
Stage in Auditorium of New Trier Township High School
Proscenium opening may be increased to full width between brick piers by folding back hinged sides

Stages should have, first of all, adequate floor space; the width of the stage should be equal to that of the hall, and its depth should be from 25 to 40 feet back of the proscenium curtain. It is well to have seating space for 200 people on the stage of a hall seating 1,000 or more auditors. The floor should be flat, but provision should be made for the installation of "bleachers" for the use of choruses at the back of the stage as well as for graduating classes. Considerable space, from 8 to 12 feet, should be given in front of the curtain so that an ordinary lecture, concert or stereopticon performance can be given without raising the curtain. The floor of the stage should be placed about 3 feet 6 inches above the lowest seated floor level in the hall, and in large auditoriums an orchestra pit should be provided large enough for 40 musicians and just deep enough that their heads and instruments shall not be above the level of the stage floor.



Auditorium-Gymnasium, Edward S. Bragg School, Fond du Lac, Wis.
An interesting solution where economy was paramount. The stage is also the kindergarten; the gymnasium floor serves as corridors, and the upper corridors may be used as balconies
Perkins, Fellows & Hamilton, Architects

It should be possible to heat and use the stage when the auditorium is not in use. Band concerts, chorus practices and debating societies all find the skylighted stage an admirable place for their activities. It would require a separate article to go into the full details for stage equipment for dramatic purposes. Every large high school stage should have a loft and gridiron for the storage, handling and control of scenery. This is a theatrical detail, and it differs in no essential respect from a theater.



Plot Plan, David Worth Dennis Junior High School Richmond, Ind.

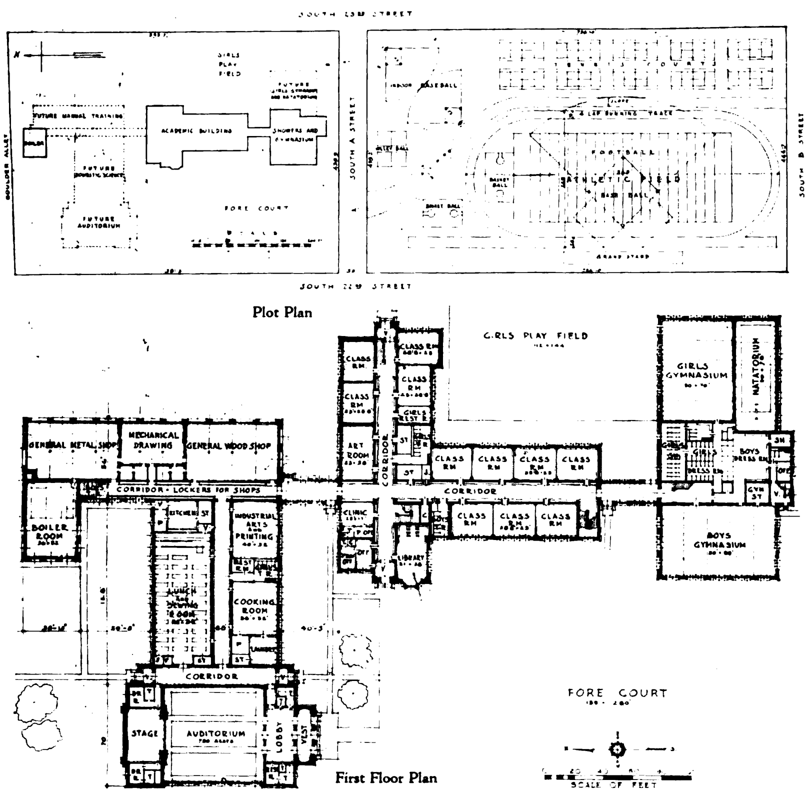
The view of the stage at the New Trier shows the opening arranged for dramatic purposes. At either side is a door of fireproof construction (steel and asbestos) which may be opened in against the proscenium wall. As these doors are each 8 feet wide, their opening enlarges the stage opening by 16 feet and provides in a simple manner for the various purposes just referred to.

The illustration shown here of the plot plan of the David Worth Dennis School, Richmond, Ind., will, with the floor plans and exterior views shown in the plate section, illustrate one solution of the junior high school community center problem, on a scale which was suitable, in that instance, for all of the requirements just enumerated. One of the other illustrations—the interior of the Edward S. Bragg School in Fond du Lac—shows a solution where both space and money were extremely limited and where corridors, kindergarten, gymnasium and auditorium have all been made to occupy the same space. Numerous kinds of use are provided for, and all that is required (not an impossible condition) is an adjustable program so that one use does not interfere with another.

There is no longer any mystery concerning the acoustic properties of auditoriums or the materials entering into their construction and equipment. The work of the late Professor Wallace Clement Sabine of Harvard University, which is now being continued at the Riverbank Laboratories in Geneva, Ill., has reduced acoustics to a mathematical science and has made it possible to design and construct auditoriums for any desired acoustic requirements with reasonable certainty of success.

Community uses are demanding and causing the equipment of large sites even for small schools. The most distinctive gauge of progress is the site which is now considered essential. The site indicated by the plot plan of the David Worth Dennis School may now be regarded as a minimum. It comprises between six and seven acres. It is not unusual nowadays to provide for junior high schools from eight to fifteen acres, and for senior high schools from ten to forty acres.

There is no influence of, or effect from, the inclusion of community facilities on the exterior design of buildings which does not necessarily result from the proper conception and designing of school buildings themselves.

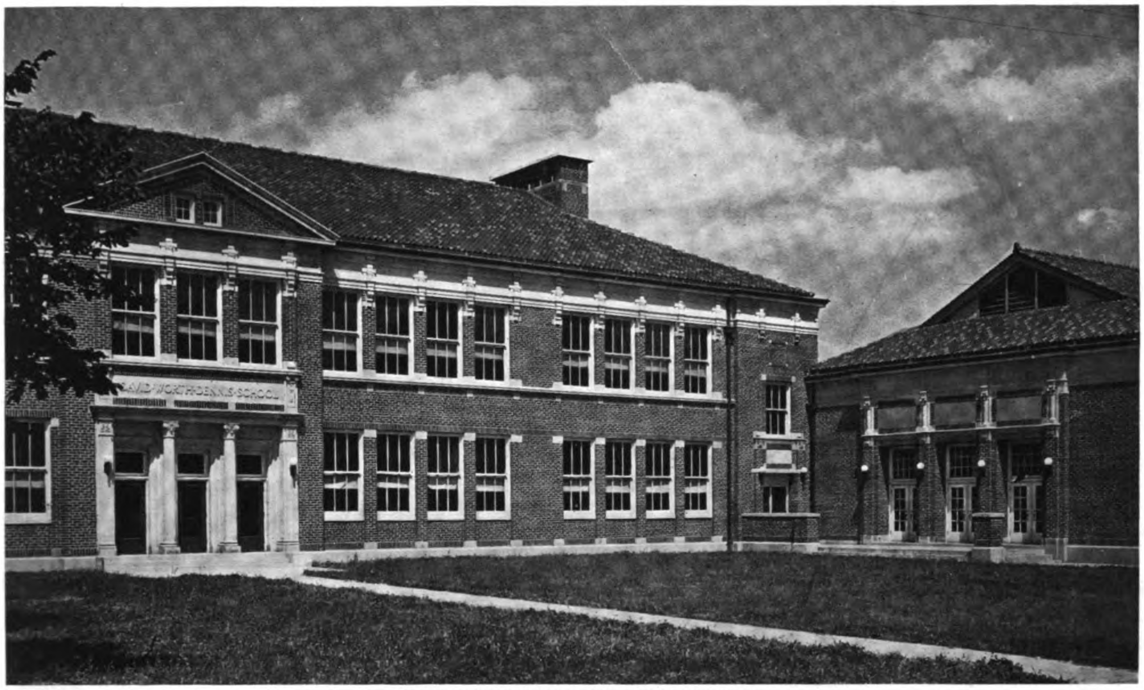


Plot Plan

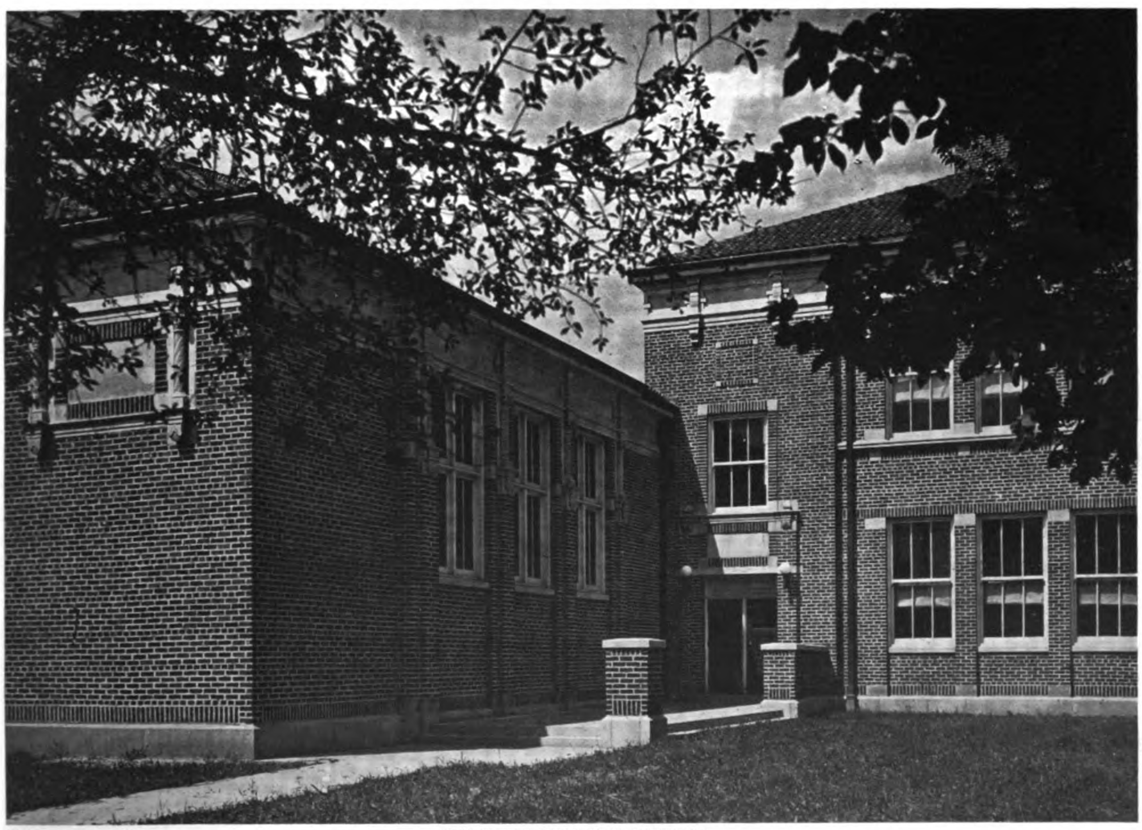
First Floor Plan

Proposed East Side Junior High School, Richmond, Ind., showing a widely different solution of similar requirements to Dennis School because of site conditions

Perkins, Fellows & Hamilton, Architects



FACADES OF SCHOOL AND AUDITORIUM



DETAIL OF GYMNASIUM WING

DAVID WORTH DENNIS JUNIOR HIGH SCHOOL, RICHMOND, IND.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS

DAVID WORTH DENNIS JUNIOR HIGH SCHOOL RICHMOND, IND.

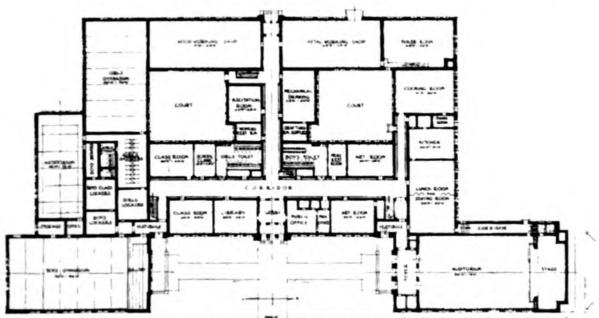
Illustrations on Plate 24

THIS building was completed in 1922 at a cost of $398,000. It accommodates 500 pupils, making a building cost per pupil of $797, including equipment.

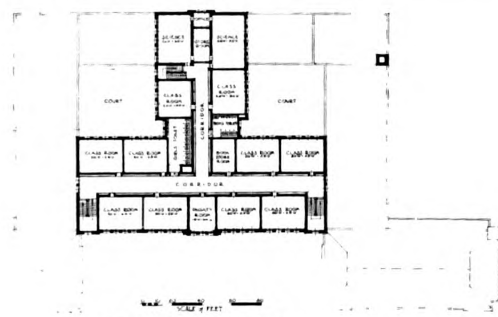
The cubic foot cost was 39.5 cents.

The construction is fireproof, being of reinforced concrete with exterior walls of brick and hollow tile with Indiana limestone trim. Partitions are of gypsum block and roof of Spanish tile.

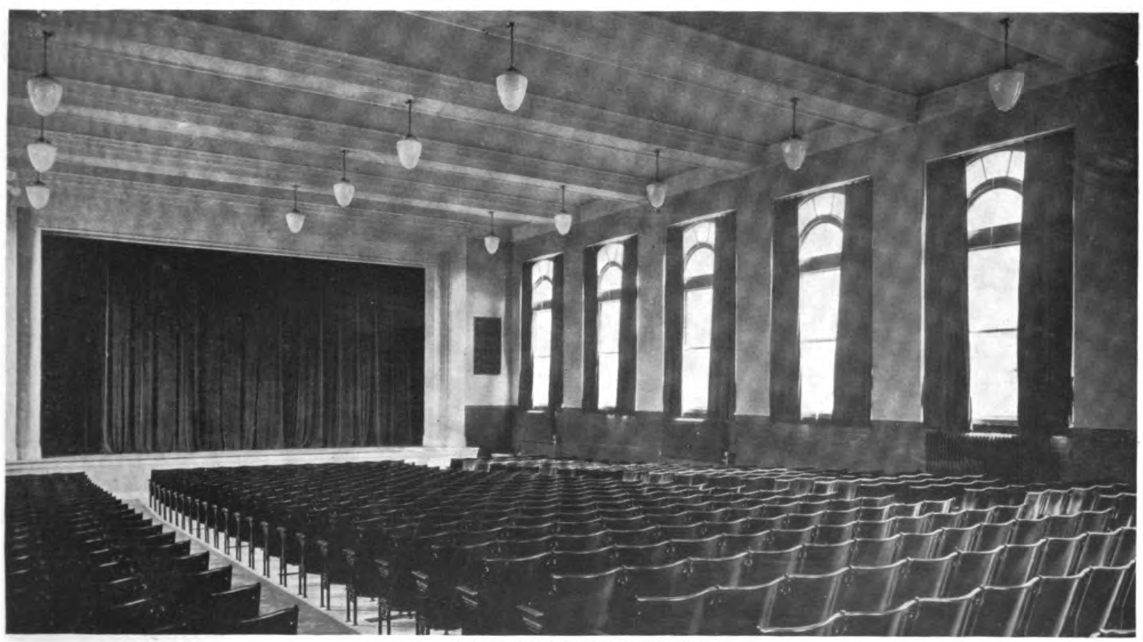
GENERAL VIEW WITH AUDITORIUM IN FOREGROUND



FIRST FLOOR PLAN



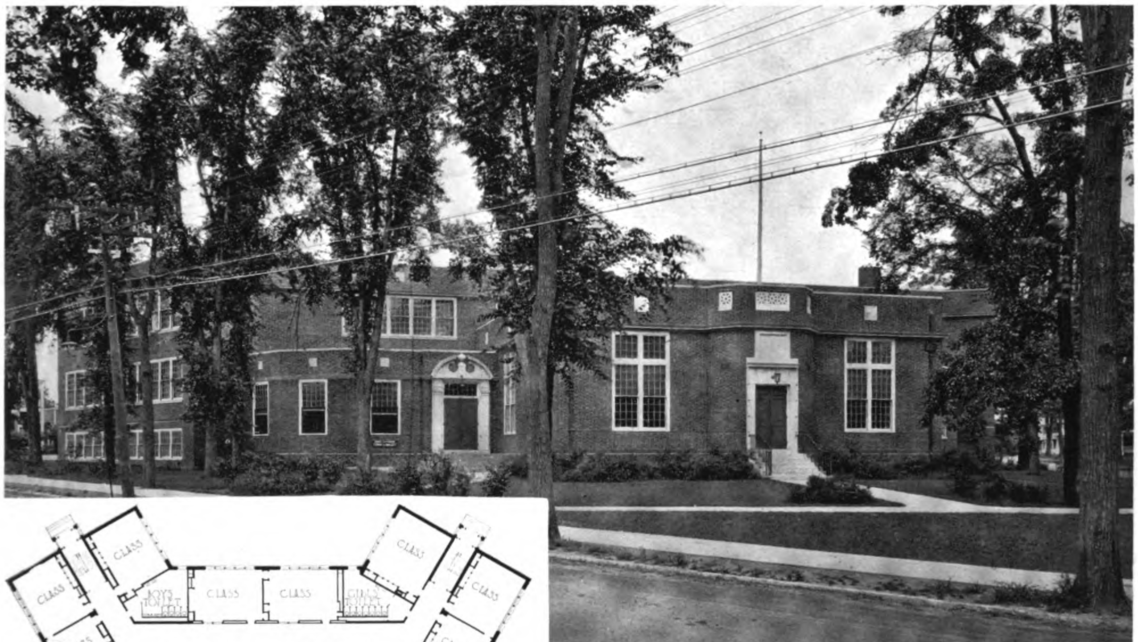
SECOND FLOOR PLAN



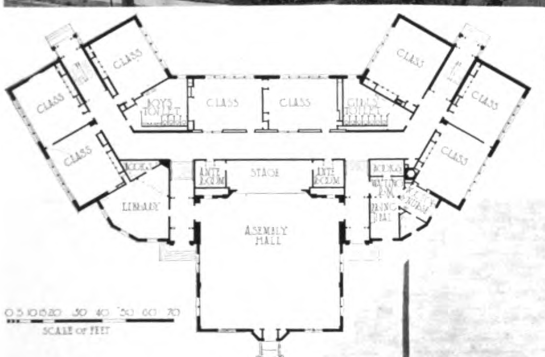
INTERIOR OF AUDITORIUM

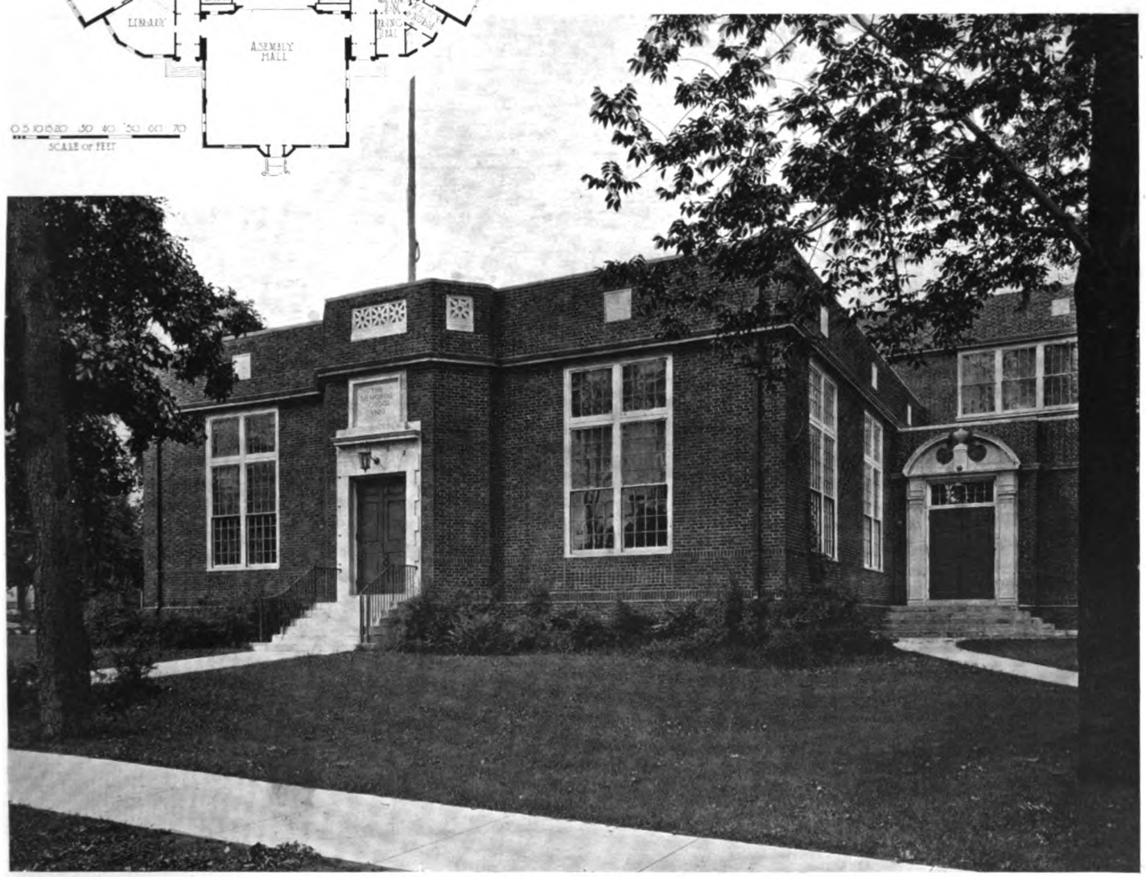
DAVID WORTH DENNIS JUNIOR HIGH SCHOOL, RICHMOND, IND.

PERKINS, FELLOWS & HAMILTON, ARCHITECTS



GENERAL EXTERIOR VIEW





DETAIL OF AUDITORIUM WING

MEMORIAL SCHOOL (ELEMENTARY), FRAMINGHAM, MASS.

CHARLES M BAKER, ARCHITECT

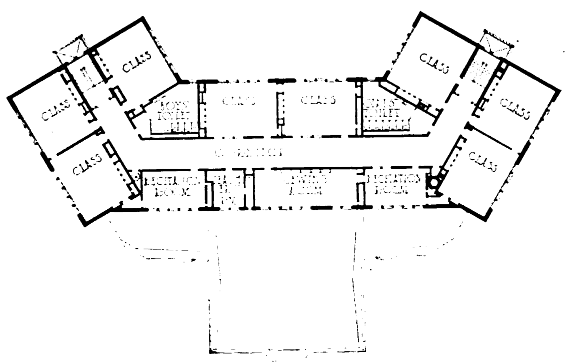
MEMORIAL SCHOOL
ELEMENTARY
FRAMINGHAM, MASS.

Illustrations on Plate 26

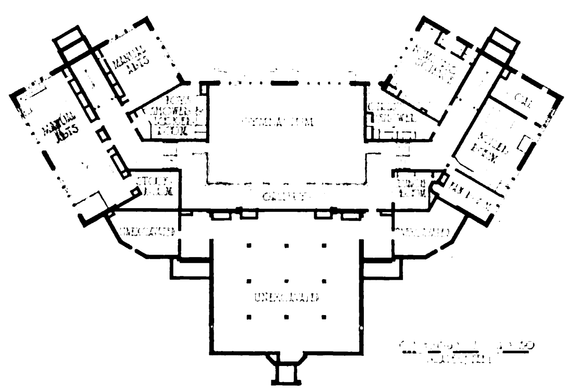
THIS school was finished in 1920 at a cost of $202,000. It accommodates 583 pupils, making a building cost per pupil of $345.

The cubic foot cost was 32 cents.

The exterior of the building is of selected common brick with trim of cast concrete. The construction is of the second class, with fireproof partitions enclosing all stairs and corridors and fireproof floors in corridors.

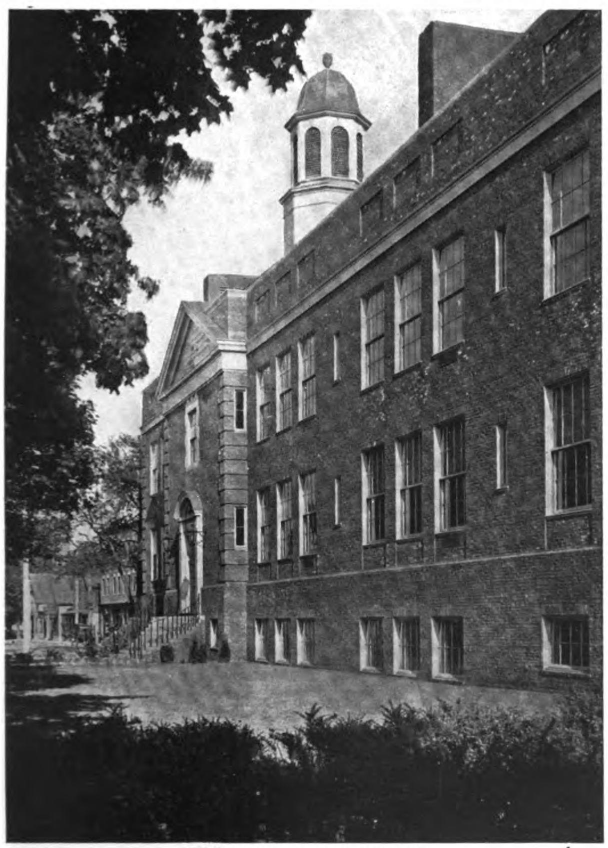


Second Floor Plan

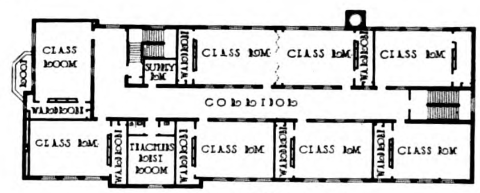


Basement Floor Plan

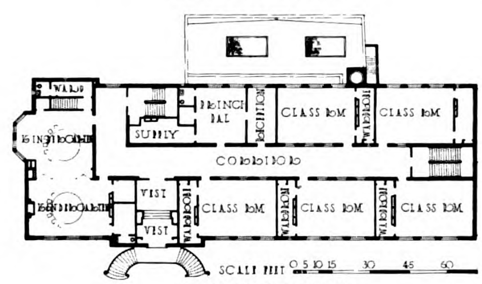
DETAIL OF MAIN ENTRANCE



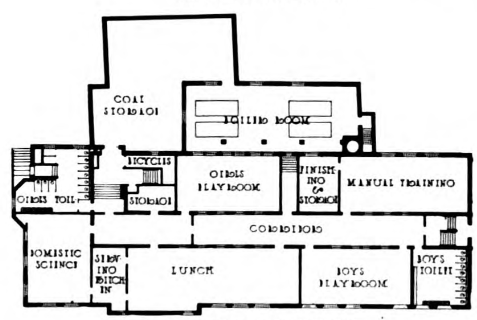
VIEW OF ENTRANCE FRONT



SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

VILLAGE ELEMENTARY SCHOOL, GREAT NECK, N. Y.

WESLEY S BESSELL, ARCHITECT

VILLAGE ELEMENTARY SCHOOL
GREAT NECK, N. Y.

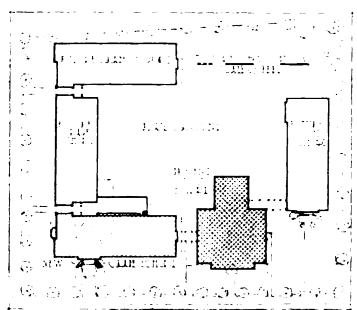
Illustrations on Plate 27

THIS school was completed in 1921. It accommodates 640 pupils.

The cubic foot cost was 42 cents.

The exterior of the building is of selected common brick in variegated color and texture, and terra cotta. The roof is of slate and metal work of copper. The construction is fireproof.

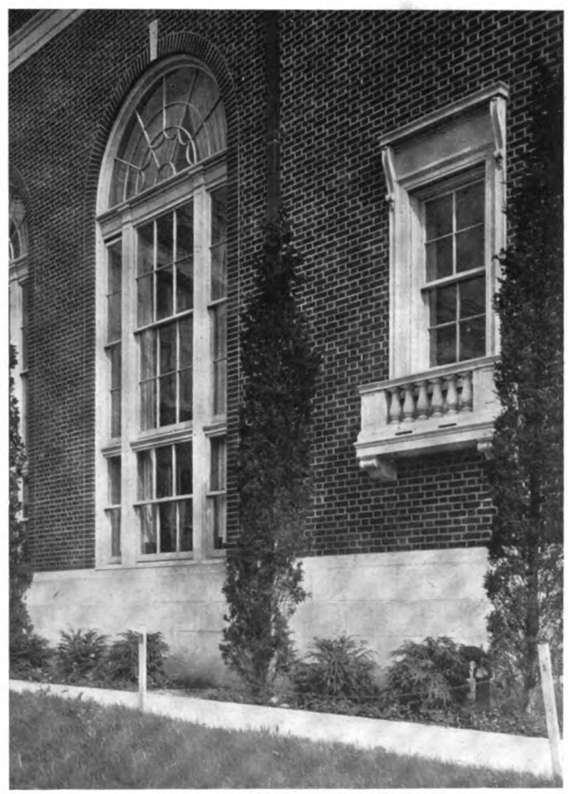
This is one of several buildings which are being developed under a group plan which provides for future expansion.



Plot Plan

GENERAL EXTERIOR VIEW

DETAIL OF SCHOOL ENTRANCE



DETAIL OF AUDITORIUM FACADE

HEMPSTEAD HIGH SCHOOL, HEMPSTEAD, N. Y.

ERNEST SIBLEY, ARCHITECT

HEMPSTEAD HIGH SCHOOL
HEMPSTEAD, N. Y.

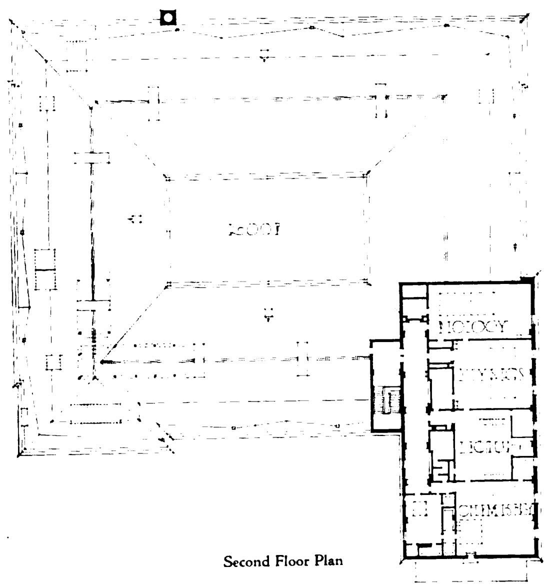
Illustrations on Plate 28

THIS high school was completed in 1921 at a cost of $654,000. It accommodates 1200 pupils, making a building cost per pupil of $445 exclusive of equipment. Equipment cost $55,000, or about 8.4 per cent of the cost of the building.

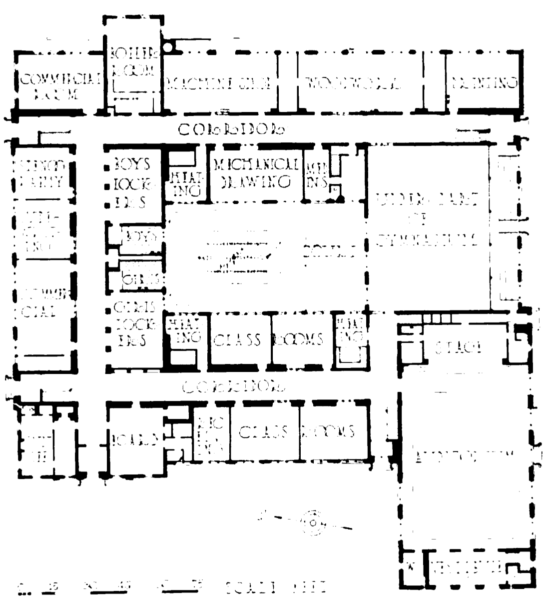
The cubic foot cost was 37.4 cents.

The exterior of this school is of red rough textured brick trimmed in cast concrete with white crushed marble aggregate. The construction is fireproof with roof of fading green slate.

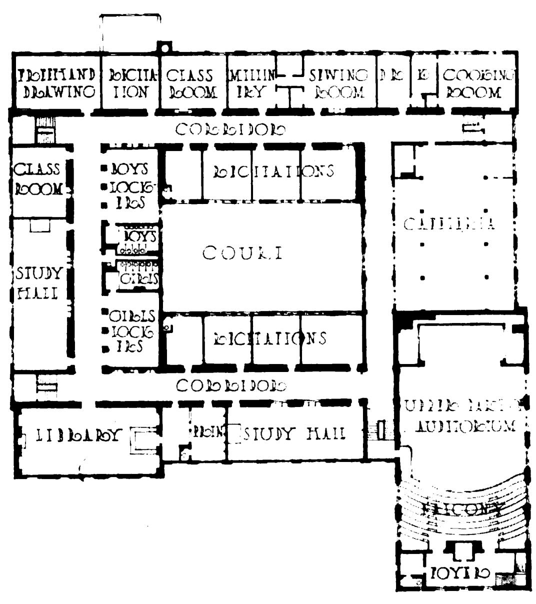
The building is heated and ventilated by low pressure steam system, including thermostatic control and humidifying apparatus.



Second Floor Plan



Ground Floor Plan



First Floor Plan

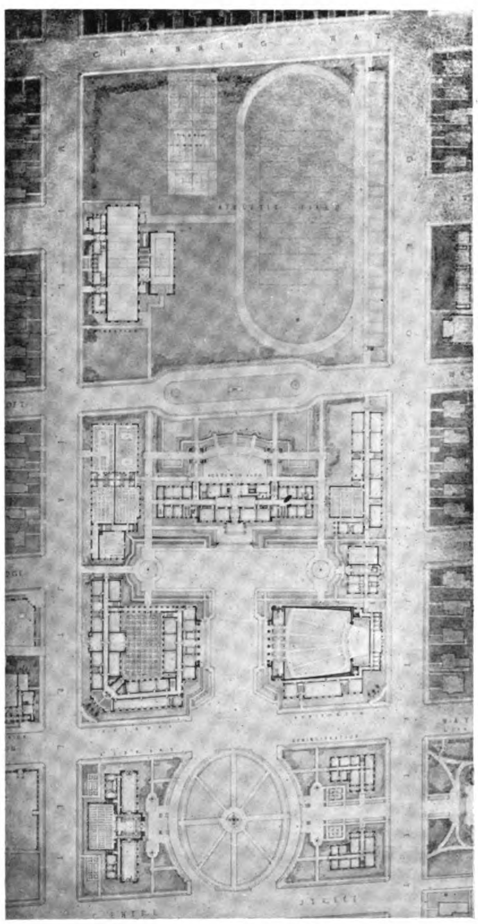
The Architecture of Schools

By WILLIAM C. HAYS, A. I. A., *Architect, San Francisco*

NOT without some self-pity sighs the banished duke in Arden, "Sweet are the uses of adversity!" At heart is he not elder brother to the small boy who, alone on the dark road, whistles to keep up his courage?

Those architects have known "the uses of adversity" who lately have had to stretch budgets of shrunken dollars to provide rooms for rapidly increasing school enrollments. Against their better convictions they have had to condense plans and build *passé* types. Some have willingly studied every possible economy within the limits of sound structure and have curtailed enrichment to the verge of poverty. Dependence has been placed on modeling in masses, purity of proportions and quality of color for whatever was to be produced in architectural effect. Has the facing of adversity brought some reward? Not in money, for the application of one's skill in effecting savings for his client costs the architect more heavily in disbursements, while its direct result is to reduce his fees. But in many a community there has come into being a respect for common materials which heretofore have been ignored or held in low repute. In the town which has put up new schools, who has not seen the influence exerted by them upon other buildings—here the use of local color, there the adoption of some other effective device?

It is always incumbent on the architect charged with spending school funds to steer clear of wasteful practices. If he is conscientious he accepts being limited to those materials and local practices which will be inexpensive in both first cost and upkeep. If the architect harbors resentment at this limitation, he is no fit man for the work. If he accepts the challenge cheerfully he is taking upon himself an interesting task, for his success or failure will lie mainly in his point of view.



General Plan, Berkeley High School, Berkeley, Calif.
William C. Hays, Architect
A. Appleton and Joseph J. Rankin, Associates

Buildings on left reading up are: Library, Science, Shops, Gymnasium. On right: Administration, Auditorium, Arts. Center: Academic Building

Myron Warner, driving a Cadillac on his own side of the concrete highway, was crowded off into deep mud by a farmer who zigzagged along in a Ford. Instead of bursting out in rage, the victim laughed back, "Stick to it, Old Timer!" Yes, the attitude of mind is important.

In considering the architecture of schools, we can best do so in the light of those limitations which the available materials impose, and since the judgment of the passerby is based upon the exterior wall surfaces, our attention to materials can be similarly narrowed down. The cheapest material in all parts of our country, wood, has many advocates who present strong arguments. "Quickly," they tell us, "the schoolhouse becomes antiquated, no matter how 'permanent' its construction may be. So why waste good money for masonry?" "Fire trap," comes back the reply. "The fire hazard in schoolhouses depends less on general construction than on mechanical equipment," is the answer, "and well planned schools have ample exit provisions, anyway, to take care of panic conditions." "Furthermore, unless schools are located in congested districts of large cities, they should be low in type and cover much land, regardless of their structural materials."

But what of wooden buildings, æsthetically considered? Occasional draftsmen's competitions for schoolhouses of frame construction have surely demonstrated the art values inherent in the proper architectural use of wood. One of the best elementary schools that has come within the writer's ken is built of unabashed "rustic" walls and shingle roofs.

Perhaps less may be said in favor of the frame building covered with cement plaster. Not frank; it masquerades as a masonry type, and its cost is often higher proportionately than people realize. But who would resist the possible

architectural effects that can be had, at relatively slight cost, by means of color, texture and play of shadows over plain plastered walls, even if a structure more permanent than woodwork cannot be afforded? On the whole, though, if money enough can be had to pay for a backing of common bricks, hollow tile, rubble stone or concrete (whichever may be locally available), the greater degree of permanency is worth having.

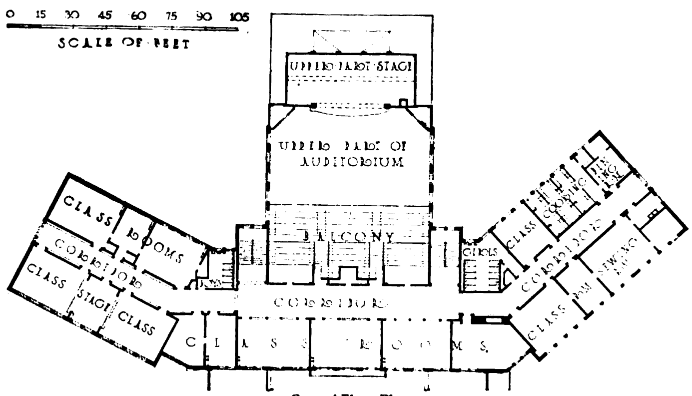
Of the experiments which have been made in special surface treatments directly on concrete walls, there has been little yet produced of a convincing nature. The attempts have been at least as expensive as plastering; they roughen the surface and catch dirt.

A most useful material for finished walls is common brick—or shall we say "uncommon brick"? It used to be a simple matter, and cheap, to specify "run of the kiln" bricks, and by selection on the job produce a wall the face of which had fine color and texture. Nowadays the bricks finest in color are sorted out at the yard and have to be bought under a special classification at high prices. However, an architect of taste can build of selected common bricks a wall of high artistic quality, and the consideration of expensive brick is not essential excepting in occasional instances.

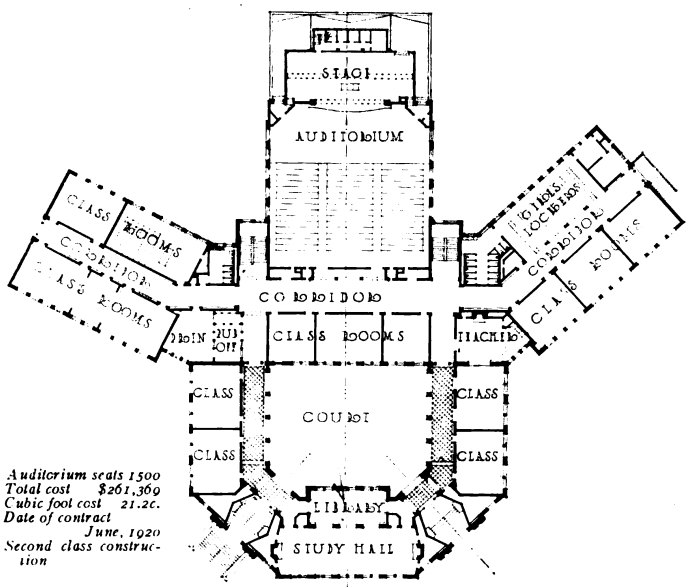
Walls of local stone can be built at low cost in some localities and are admirable if the buildings are not too large. But mere size sometimes demands more sophistication, bringing in the need for cut stone trimmings. Formal treatments, entirely of cut stone, are appropriate, even if not demanded in certain special cases, as when the schoolhouse is one of several monumental buildings, grouped around an open square or occupying an axial or terminal position.

Just as the materials for wall surfaces must be inexpensive, so should decorative features be confined to such as are low in cost. In some neighborhoods this principle will not prevent the use of a modest amount of cut stone; in other districts, where clay products are plentiful and good building stone scarce, terra cotta comes to the aid of the designer. Still another possibility is cast cement, in which pigment will control the color. For surface treatments on plastered walls there are the lately revived possibilities found in the use of applied color. The reservation must be made, of course, that climatic conditions permit. A few skilled men have produced some notably fine examples of the old Italian renaissance art of "sgraffito," but not many are masters of its difficult technique. Some experiments have been made, with varying success, in the use of painted stencil designs in well protected places. Jules Guerin produced some fine effects in this way at the San Francisco Exposition, and his lead has been followed by other adventurers. Since painted exterior decorations have long withstood the weather on the exposed hillside houses of Genoa, it is not unreasonable to expect durability under similar conditions in America.

Style is another phase of the subject, "Architecture of Schools." The meaning of the word "style" is vague. By it do we mean the defined historic periods and types?—or do we mean fitting expression of the special qualities in given materials?—or might we accept the less common use of the term and let it signify response to certain dominant physical needs of the problem? The writer's prefer-



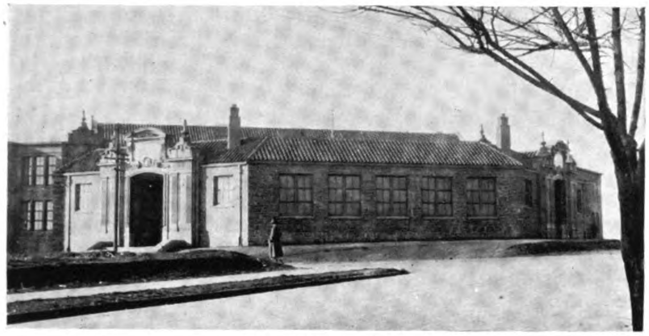
Second Floor Plan



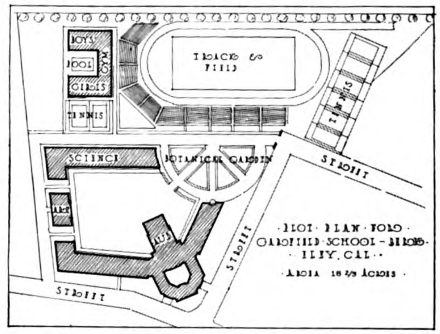
Auditorium seats 1500
Total cost $261,369
Cubic foot cost 21.2c.
Date of contract June, 1920
Second class construction

First Floor Plan

Garfield Junior High School, Berkeley, Calif.
William C. Hays, Architect
A. Appleton and Joseph J. Rankin, Associates



View of Entrance Front



Plot Plan

Garfield Junior High School, Berkeley, Calif.

ence would be to attach relatively little importance to the accepted style designations such as "English Gothic" and "French renaissance," for the very definite reason that our problems are so new and complex as to make close adaptations of the old types impracticable. Why not "Mediterranean coast styles," "north country styles" and the like, with the very definite connotations of such terms?

As far as facade is concerned, we must accept one feature of school buildings as dominant: that is the classroom window, and because a school building consists mainly of classroom units its design becomes a composition of voids and solids. Now no classroom can be good unless it has plenty of light and air, combined with desirable exposure. Perhaps school statisticians go too far in claiming empirical proportions between floor areas and glass areas, without giving thought to special or local conditions. There is no use in attempting to provide daylight for the darkest overcast days, for artificial light will then be needed, anyway, along the inner halves of all the classrooms. May it not be poor practice to accord with theoretical generalizations at the risk of a glare during the other parts of the year? Is it reasonable to apply the same measure to window areas of buildings in the bright sun of Florida or California as in the more sober light of New England? But even if we reduce the glass areas of the standardizers to suit conditions in the San Joaquin Valley or at Key West, we will still have rooms each of which will have one of its long sides largely of glass. Then, too, classrooms being unilaterally lighted, any which occur in the angles of the plan will demand unpenetrated surfaces "around the corner."

However, the modern school facade is not all classroom windows; large parts of the building are given up to other purposes, and some rooms are best lighted by windows more nearly in the scale of domestic architecture. Indeed one of the school architect's greatest difficulties is the solution of this conflict in scales of the various openings. In design the typical bank of classroom windows is a group composition inherently awkward in proportion, its width being generally two or more times its height. The commonest solution of this problem is by a strong marking of the vertical divisions with either mullions or piers. Of the old architecture in Europe, those buildings which most nearly approximate these present conditions are the Tudor structures, and it is for this reason, probably more than any other, that the type has been so generally adopted. The result of common use of this modified Tudor type in districts geographically separated and climatically unlike has been to make it commonplace and to rob it of any local quality. Looking through magazine files, one finds virtually the same thing in the city of Washington, the state of Washington, Washington County, Missouri, and the Lord knows where not. The type is readily distinguishable as the "schoolhouse," but not as, say, the "El Paso school."

At the beginning of the architect's study there

Detail of Entrance

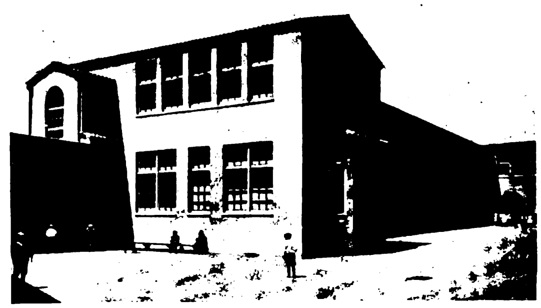
Garfield Junior High School, Berkeley, Calif.

must be determined the type of plan—whether compact and high, or free and open. A present administrative policy tending toward large school units, with high salaried principals in charge of many teachers, may promote efficiency and lessen administrative costs, but it brings up a serious architectural problem in the mere bulk of the buildings. Size is not of itself a drawback; in the congested parts of great cities, on the contrary, it may count as a help by giving right scale in relation to adjoining buildings. But locations in such districts should be avoided when possible, and the best type of schoolhouse stands free among neighboring buildings which are small in both mass and scale. Here the twofold problem of bringing the school into some modest relationship to its neighbors, while maintaining its significance and dignity, is no light task for the designer.

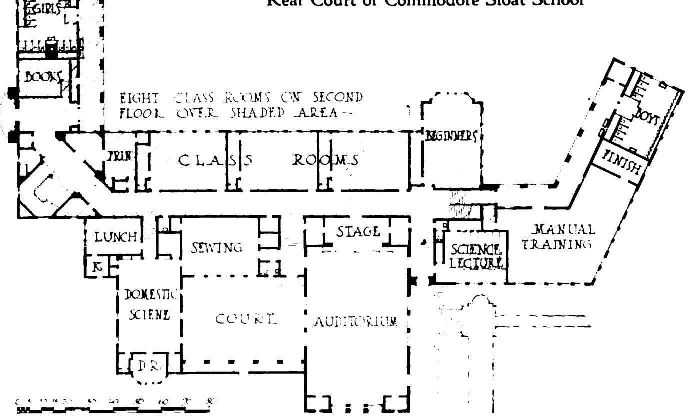
Group composition rather than simple mass appeals strongly as a solution of this problem. The group plan has its virtues and its disadvantages. It is flexible, may be easily added to, separates unrelated functions and gathers for sub-administration those elements which cohere. Its several departments may be operated inexpensively at night or during normal vacation periods. The group plan has a few disadvantages, much over-estimated by those not used to the type. The "proof of the pudding is in the eating," and it is rare that any comment (but in praise) is made of group-plan schools by those who pass their days in them.

The school architect may be fully converted to a progressive type, however, yet have few chances to prove his convictions. Practically, as a public school system is organized, the board seeks a trained administrator for superintendent and passes to him a responsibility which he will accept only, and properly, if his technical judgment is to be in effect final. Similarly (but often with less informed judgment) the board in conference with the superintendent engages an architect. Now it happens that the profession of architecture requires for any degree of stability that its practitioner must stay "fixed" in one locality, while school administrators are great shifters, for they have no clients and they carry much of their equipment "under their hats." So there may come about the anomalous condition wherein an architect of national reputation, established in his community for decades and knowing well all local conditions, finds himself in double harness with a superintendent whose general qualifications may be equally high in his specialty as an administrator, but whose architectural prejudices, perhaps brought from a distant part of the country, are accepted without question by the board. Furthermore, the superintendent finds himself in straits, for he must be the diplomat, first, last and all the time, with the several school communities within his city, with principals, teachers, parents, amateur critics and the town meddler. He dare not, if he would, risk the progressive things that might sometimes be adversely criticized as eccentric or as favoring one school above another. Where conditions have been right, the group-plan school has been the outcome. As the successful ones win approval and become talked about, the proponents of the type have to do a little less pioneering.

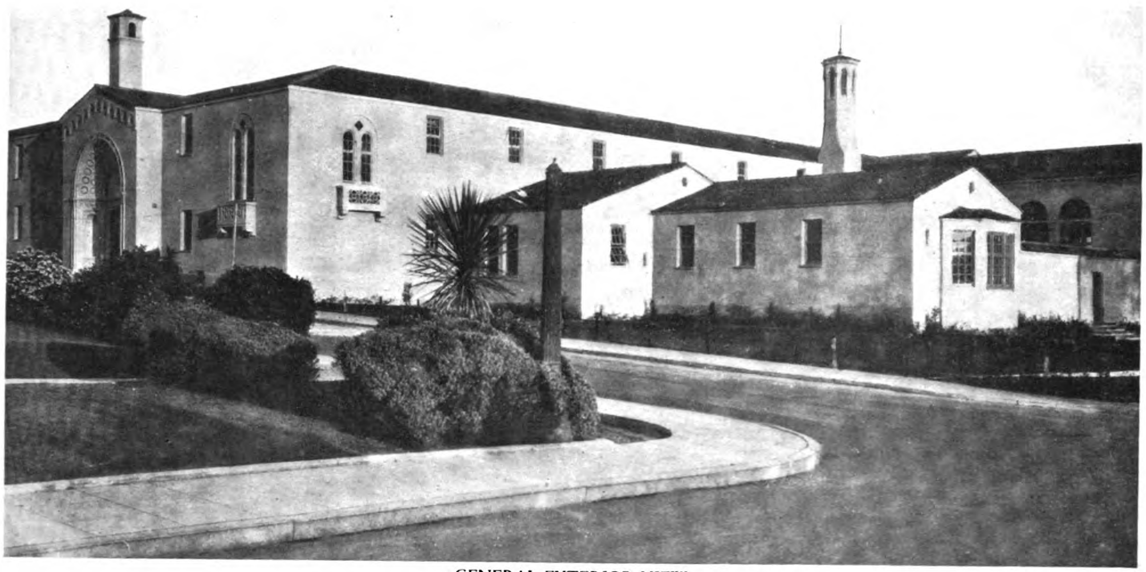
"Group types" vary to suit the nature of the school's work. In common, however, the groups contain special elements for administration, assemblage and physical culture (these two sometimes combined), community work, lunch facilities and special activities, such as domestic science and manual training. Several of these, when logically correlated, are combined under one roof; the units thus created are placed in relation one to the other so as to give plenty of light, air and sunshine. Some portions are logically one-story, and others multiple-story structures. Ensemble is studied with connecting links of open arcades or closed corridors, as climatic conditions necessitate, always keeping the travel distances down to a reasonable minimum.



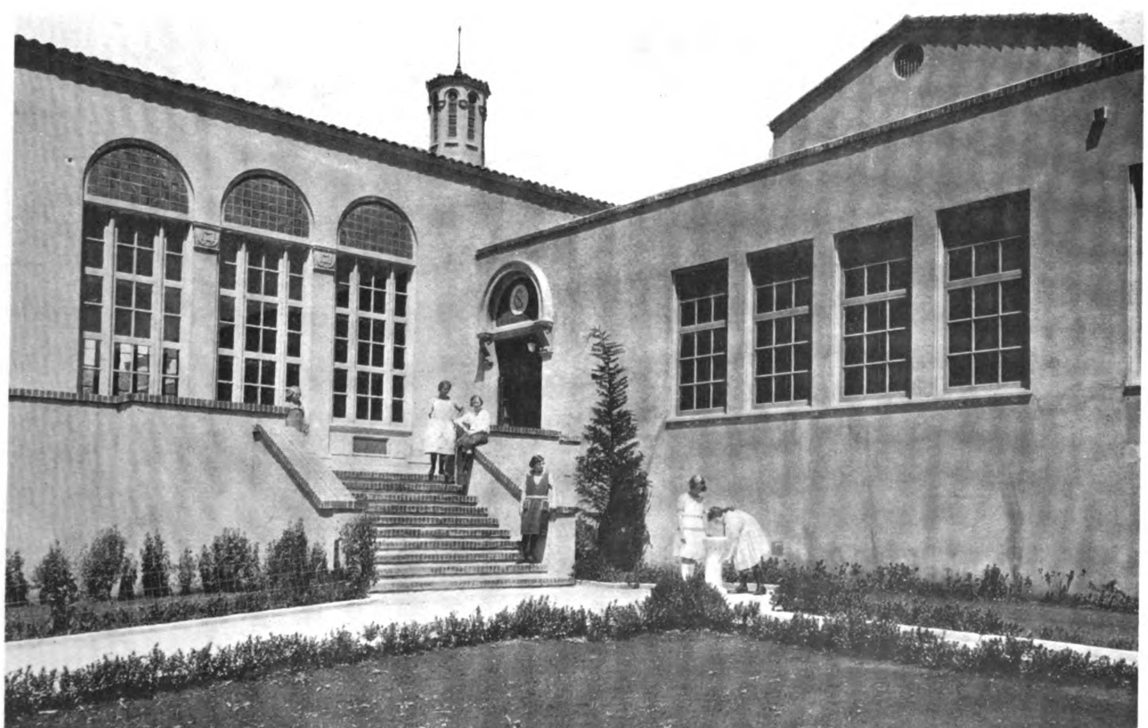
Rear Court of Commodore Sloat School



Floor Plan, Commodore Sloat Elementary School, San Francisco, Calif.
John Reid, Jr., Architect



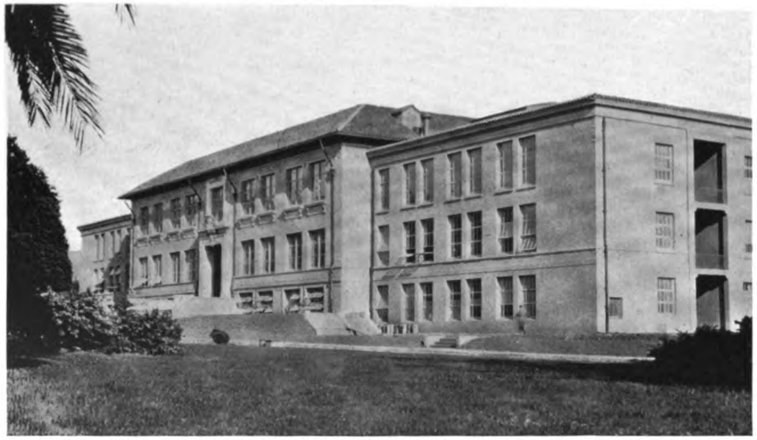
GENERAL EXTERIOR VIEW



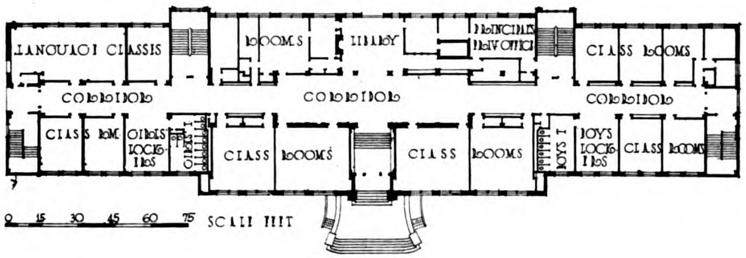
DETAIL OF AUDITORIUM TERRACE

COMMODORE SLOAT ELEMENTARY SCHOOL, SAN FRANCISCO

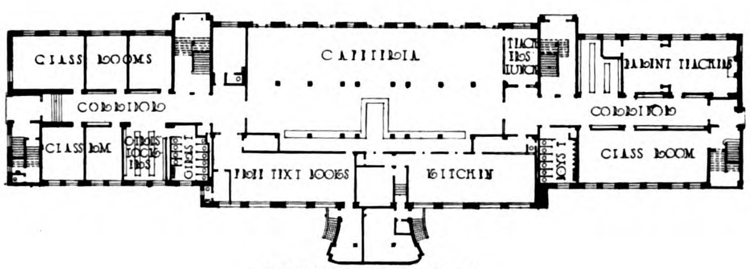
JOHN REID, JR., ARCHITECT



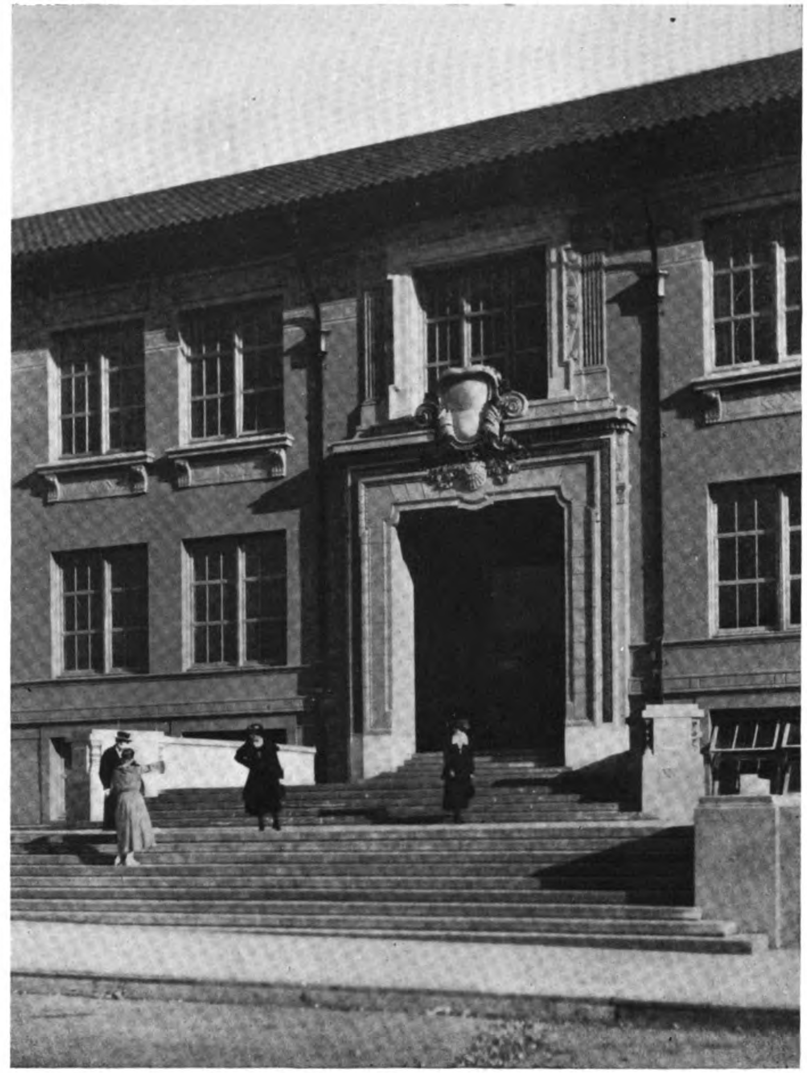
GENERAL EXTERIOR VIEW



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



DETAIL OF MAIN ENTRANCE

ACADEMIC BUILDING, BERKELEY HIGH SCHOOL GROUP, BERKELEY, CALIF.

WM. C. HAYS, ARCHITECT; A. APPLETON AND JOSEPH J. RANKIN, ASSOCIATES

ACADEMIC BUILDING
BERKELEY HIGH SCHOOL
BERKELEY, CALIF.

Illustrations on Plate 30

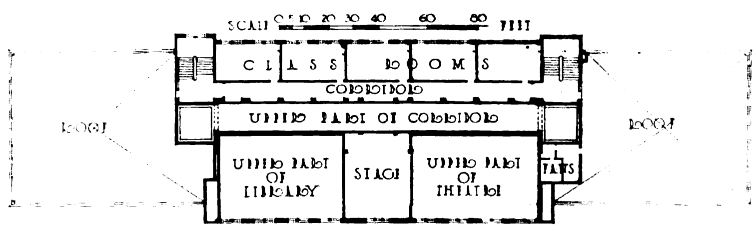
THIS school was finished in 1920 at a cost of $361,623.

The cubic foot cost was 34.6 cents.

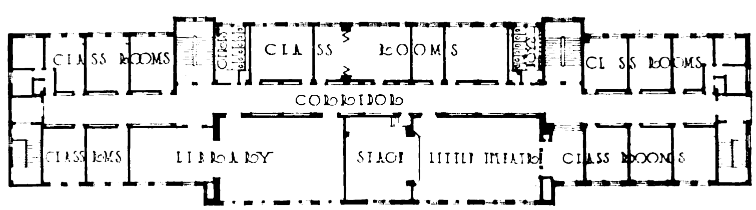
The cost of equipment was 10 per cent of the cost of the building.

The exterior walls of the building are of terra cotta tile and stucco; the roof is of clay tile. The construction is fireproof, of reinforced concrete.

This is the first building of an extensive group planned in conjunction with a civic center development as shown in the plan on page 69.

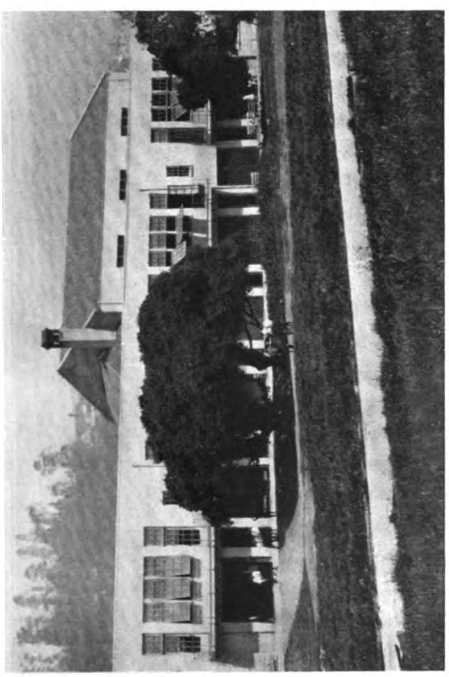


Third Floor Plan

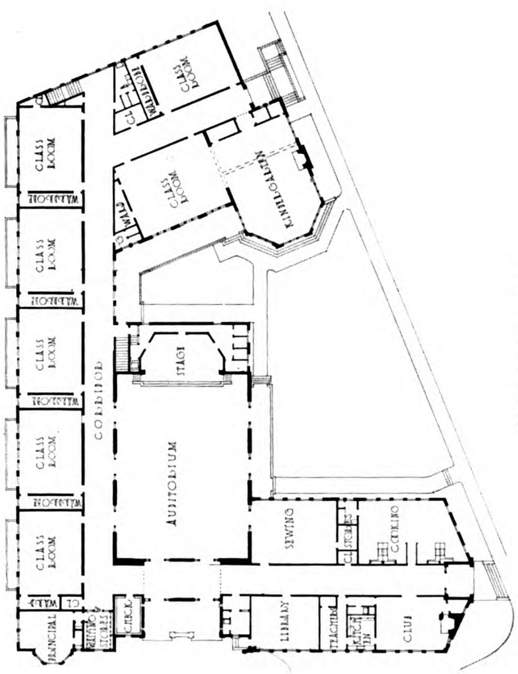


Second Floor Plan

DETAIL OF ENTRANCE FRONT



VIEW OF REAR



GROUND FLOOR PLAN

THOUSAND OAKS ELEMENTARY SCHOOL, BERKELEY, CALIF.

WM. C. HAYS, ARCHITECT; A. APPLETON AND JOSEPH J. RANKIN, ASSOCIATES

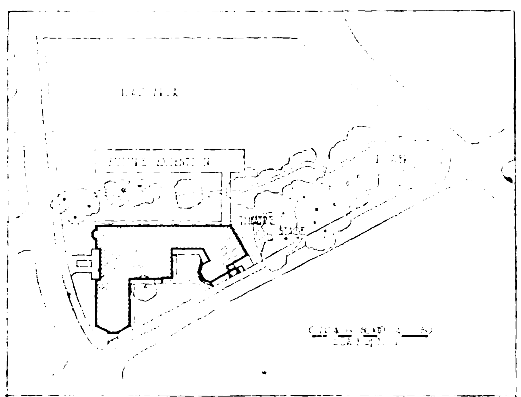
THOUSAND OAKS
ELEMENTARY SCHOOL
BERKELEY, CALIF.

Illustrations on Plate 31

THIS school was finished in November, 1919, at a cost of $102,264.

The cubic foot cost was 18.7 cents.

The construction is of frame with stucco exterior and concrete foundations, designed to carry an extra story. The roof is of clay tile.



Plot Plan

Interior Finish and Decoration of Schools

By CHARLES M. BAKER, A. I. A., *Architect, Boston*

VERY little has ever been written concerning the interior finish and decoration of schoolhouses, and when one starts to search for material one is confronted with a paucity of information on this subject; and in the absence of any information or standard of procedure, I shall assume that my opinion on this subject is authoritative and proceed as if it were not to be questioned. Naturally, the interior treatment of the building logically follows the expression of the exterior. One is impressed with the thought of how rarely a schoolhouse suits its environment and is of pleasing design, which perhaps is explained by the fact that many architects are selected by political preference rather than from demonstrated ability to design and construct a satisfactory building.

In all probability, the strongest influence on the exterior design of the building has been the necessity of grouping the windows, which has led naturally, by the line of least resistance, to the adoption of Elizabethan, collegiate Gothic, or some similar free style, and it is apparent to the designer who attempts to work in a style which requires large wall surfaces with relatively small penetrations for the window openings, that this grouping is a distinct embarrassment.

Let us first consider the entrance hall as being the place where the first impression of the building is gained and where we consciously or unconsciously form our opinion of the entire school. Here at least we are not unduly hampered in architectural design or by style. Reasonable latitude is possible in the use of cornices, pilasters and similar details, and with the fireproof construction of the corridors in many buildings, even though of second class construction elsewhere, the opportunity to use tile and other permanent floor materials should not be neglected. Figure 1 shows a well designed corridor and entrance hall, with a breadth of treatment highly commendable. Many times the most unpretentious buildings may be enhanced in beauty by some simple device, such as a niche in the vestibule, or tablets on the walls, giving the history of the school or other matters of similar interest. It is possible that the juncture of the main corridor with the main entrance hall may be slightly enlarged and treated as a small rotunda to give added interest. The corridor, which is used so distinctly for purposes of service, should be treated in the most matter of fact way to bear the brunt of the wear and tear occasioned by constant use. Here may well be hung pictures, framed to harmonize with the general finish.

While the use of brick, painted or glazed, for walls, is to be found in many instances, it must be admitted that this treatment falls far short of the mark toward making a cheerful or homelike interior, and

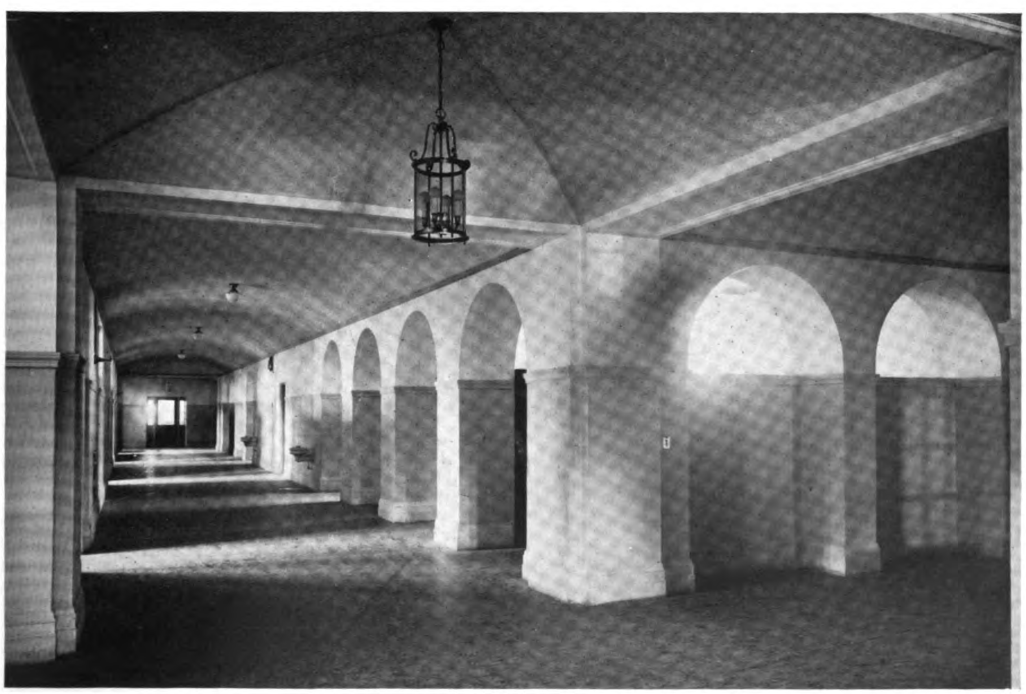


Fig. 1. Ground Floor Corridor of Hempstead High School, Hempstead, N. Y.
The arched openings are entrances to locker aisles
Ernest Sibley, Architect

Fig. 2. Auditorium of Hempstead High School, Hempstead, N. Y.
Ernest Sibley, Architect

savors rather of the factory or prison. It would seem to be logical that the schoolhouse, especially the smaller example, might well be treated at a scale as near that of domestic work as possible, that the transition from the home to the school may not be sudden or abrupt and thrust an entirely new element into the lives and thoughts of the pupils.

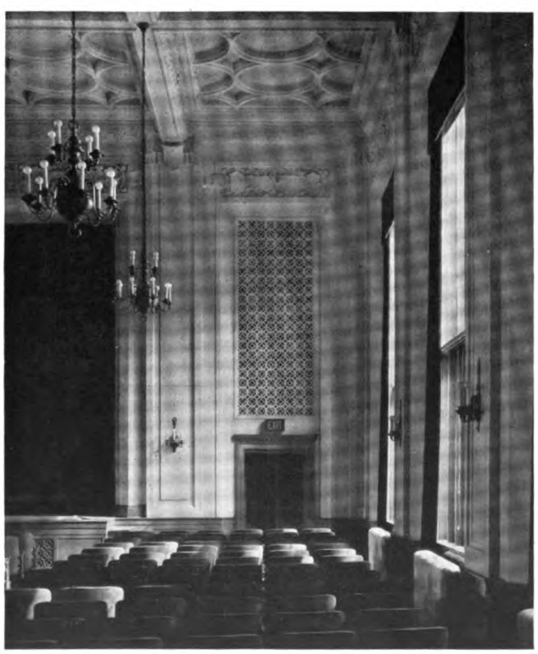


Fig. 3. Detail of Auditorium, Coventry School
Cleveland Heights, Ohio
Franz C. Warner, Architect

Staircases are often made uninteresting and dull by the use of detail which is much more commendable from the standpoint of service than from that of attractiveness. I have found in my experience that an iron staircase can be relieved of its prison-like aspect by the introduction of details of posts and balustrades similar in design to many of the straightforward staircases found in fine old colonial buildings, the posts to be made round with square blocks to receive the rails and stringers and finished with turned finials, attractive in form and suitable for use; a plain balustrade, one-half inch by one inch square rods, with a channel iron stringer, improved by the use of face plate and metal mouldings, all painted gray with black slate treads or the gray of concrete, gives an effect of considerable charm. Corridor and staircase would naturally be painted a warm buff tone, with a view of creating an effect of sunlight in parts of the building which are of necessity apt to be dark.

In the auditorium, if the building possesses one, the architect has the greatest latitude in architectural design in which he is allowed to display his ability, for this usually is a fine, high space warranting embellishment. Plaster casts are often used as decoration in the auditorium, and in the form of busts and plaster statues, or bas reliefs relatively large, provided suitable places are arranged for them, will give a scholastic atmosphere to the room which is admirable. Plaster ceilings, moulded and strapped, with moulded cornices and beams, find a logical use in the auditorium. Figures 2 and 3 show two auditoriums, much different in general treat-

ment, but both worthy of study. Figure 4 is a pencil sketch showing a dignified interior given a classical treatment. The widest latitude is possible in the selection of color for the walls, but it is natural that they should be kept light and cheerful; perhaps tones of gray are to be preferred, contrasted with white. Then, in treating the auditorium, we are confronted immediately by the necessity of adding furniture for the seating, and usually we must add seats which are ugly and inappropriate to an otherwise well designed room; this seems to be a necessary evil, and up to the present time the only way to mitigate it is to select for the stage, furniture of appropriate form and design, which it need not be difficult to do.

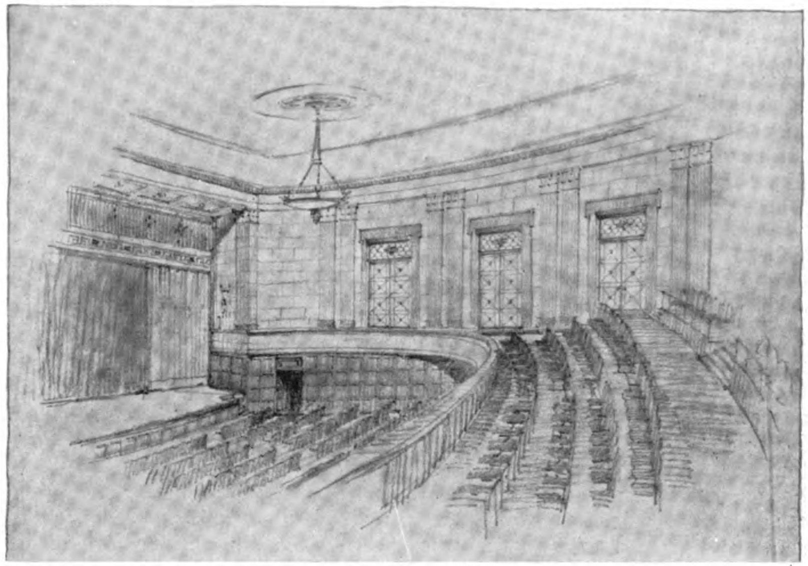


Fig. 4. Sketch for Auditorium of East High School, Columbus, Ohio
Howell & Thomas, Architects

Perhaps the room which has received least consideration in architectural design, but which really deserves the most, is the classroom, for in this room the pupils spend the greater part of the school day, and since they are most closely associated with it, what more appropriate place could be found for intelligent treatment than the room which exerts the greatest influence on character and temperament of the children who are the future fathers and mothers of the generations to come? Here their ideas are formed and perhaps their whole lives shaped. Again, could we not endeavor to design our classrooms so that they might be more domestic in scale? The classroom, it must be admitted, is so hedged about by law, convention and standardization that it leaves very little to the impulse or the imagination of the architect. Fixed in height, restricted as to its window area and locations, the necessity of having blackboards on practically all sides, the dividing of its vertical wall into two equal spaces made by the top of the blackboard, and then filled with stupid and uninteresting furniture, ugly in design, the ironwork of which assumes fantastic shapes and has nothing to commend it on the side of the artistic—we are confronted with a problem which might well make us discouraged.

Fig. 5. Kindergarten, Madison School, Syracuse, N. J.
James A. Randall, Architect

Due to the necessity of lowering costs during the last few years, yellow pine has become a much used material, and this again adds to our limitations. There are few stains that are durable and effective at the same time, when used in conjunction with yellow pine. We are almost restricted to the two colors, green and brown, the brown being often toned with gray, and it would seem to be the lesser of two evils to use brown, which at least has the virtue of being serviceable, and then perhaps somewhat mitigate

the ugliness of the school desks, at a slight increase in cost, by staining them to correspond to the finish of the room. A slight touch of good taste and interest may be added in the selection of the teacher's desk and table, and further by utilizing for the teacher's desk chair and side chairs some of the forms used in our ancestral furniture. As for color on the walls, buff or yellow seems to be logical to harmonize with the brown treatment of the woodwork, at the same time giving an air of sunshine and cheerfulness to the room, contrasting pleasingly as it does with burlap, where used in tack boards and below the chalk rails.

Fig. 6. Superintendent's Office, Hempstead High School
Ernest Sibley, Architect

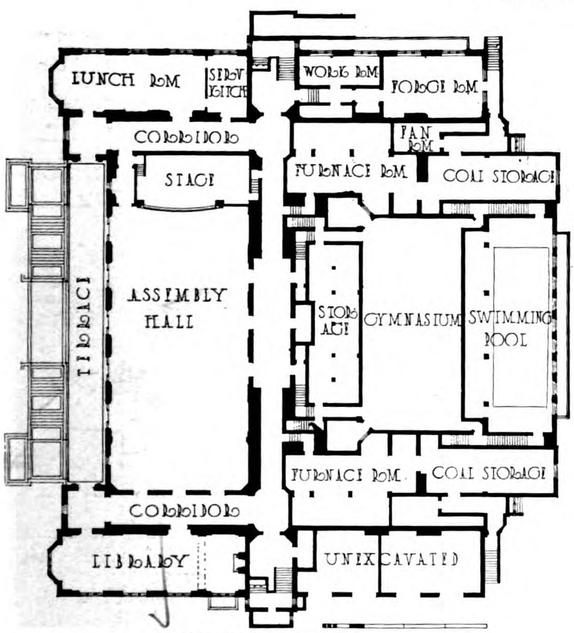
In Massachusetts the law prevents the use of beams on the ceilings of classrooms for fear of its influence on the heating and ventilating systems; still, it would seem that we might resort to some method of ceiling treatment to increase the attractiveness of the room. Low relief design or strapwork would hardly be considered an interference with the heating system, and the now largely discarded cove ceiling might be brought back to use with a view to decreasing the apparent height of the classroom, giving a more pleasing vertical subdivision of the wall space.

The special rooms in a school building perhaps give us the best opportunity to use some decorative method, and possibly best of all would be the kindergarten, with fireplace, if it has one, and an opportunity for the use of stenciled designs and patterns in the form of foliage or animals, or in any other interesting subject, approaching somewhat the typical treatment of nursery walls.

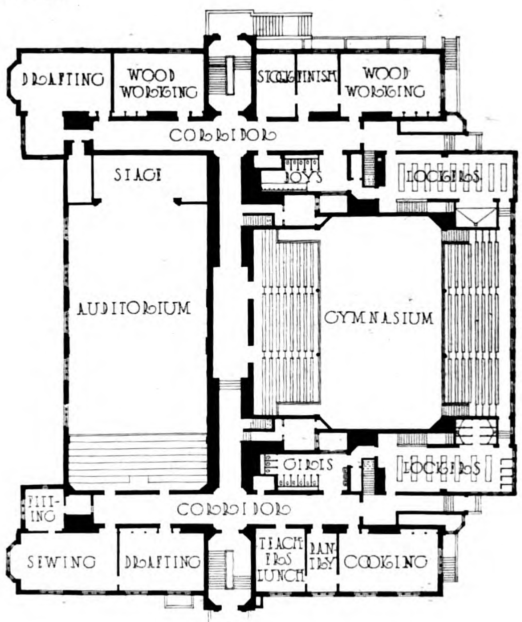
Often in visiting schools in operation one is impressed by the attractive appearance of a few plants growing in pots on the sills of the windows, or by the suggested flowers drawn on the window glass. Is there not a thought here? Build flower boxes as a part of the window detail, and encourage the growing of plants in classrooms.

Fig. 7. Library of Hempstead High School, Hempstead, N. Y.
Ernest Sibley, Architect

GENERAL EXTERIOR VIEW



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

EAST HIGH SCHOOL, AKRON, OHIO

FRANK L. PACKARD, ARCHITECT

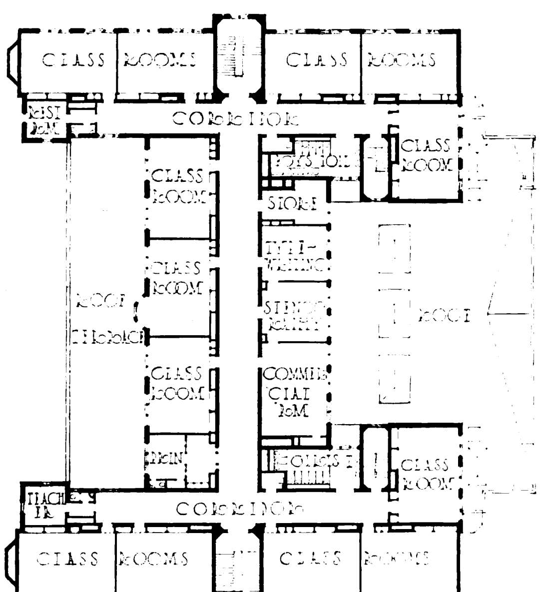
EAST HIGH SCHOOL, AKRON, OHIO

Illustrations on Plate 32

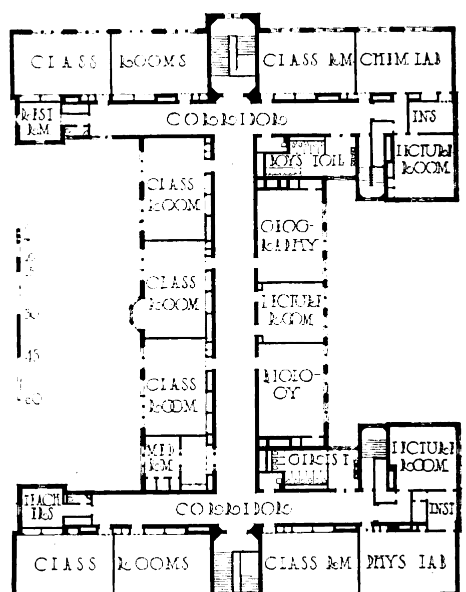
THIS high school was completed in 1917 at a cost of $384,111.39. It accommodates 1691 pupils, making a building cost per pupil of $231.29.

The cubic foot cost, exclusive of equipment, is 24.67 cents.

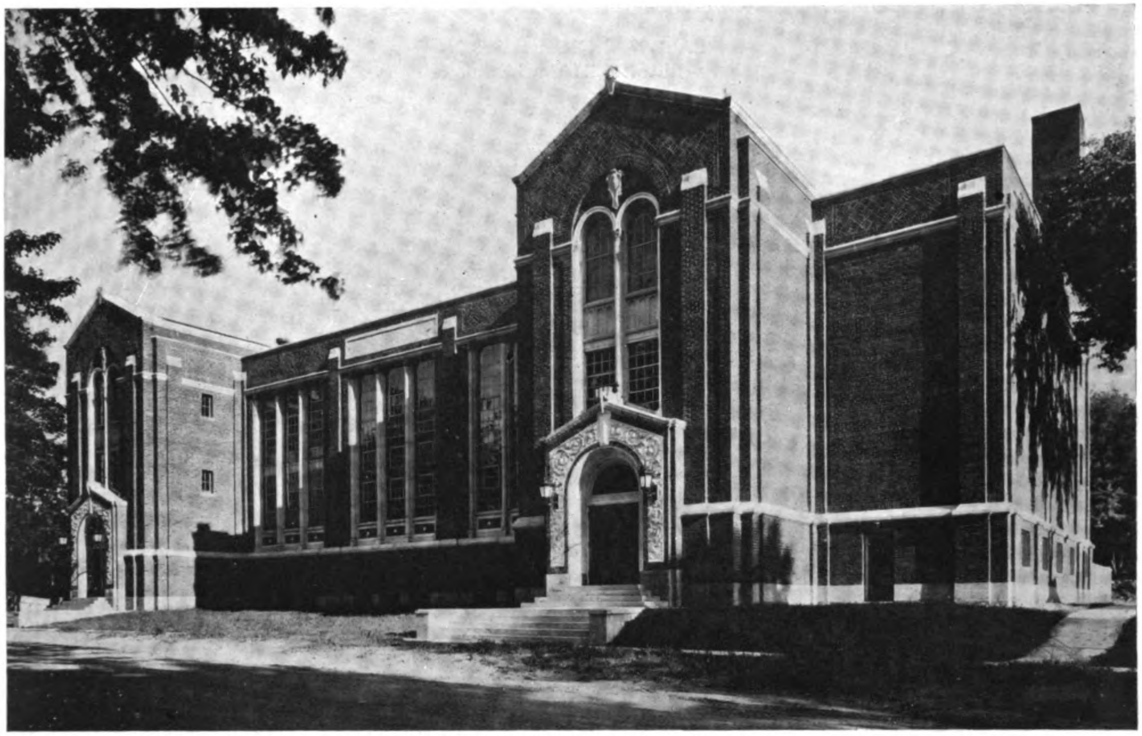
The exterior walls of the building are of brick and Indiana limestone. The construction is fireproof.



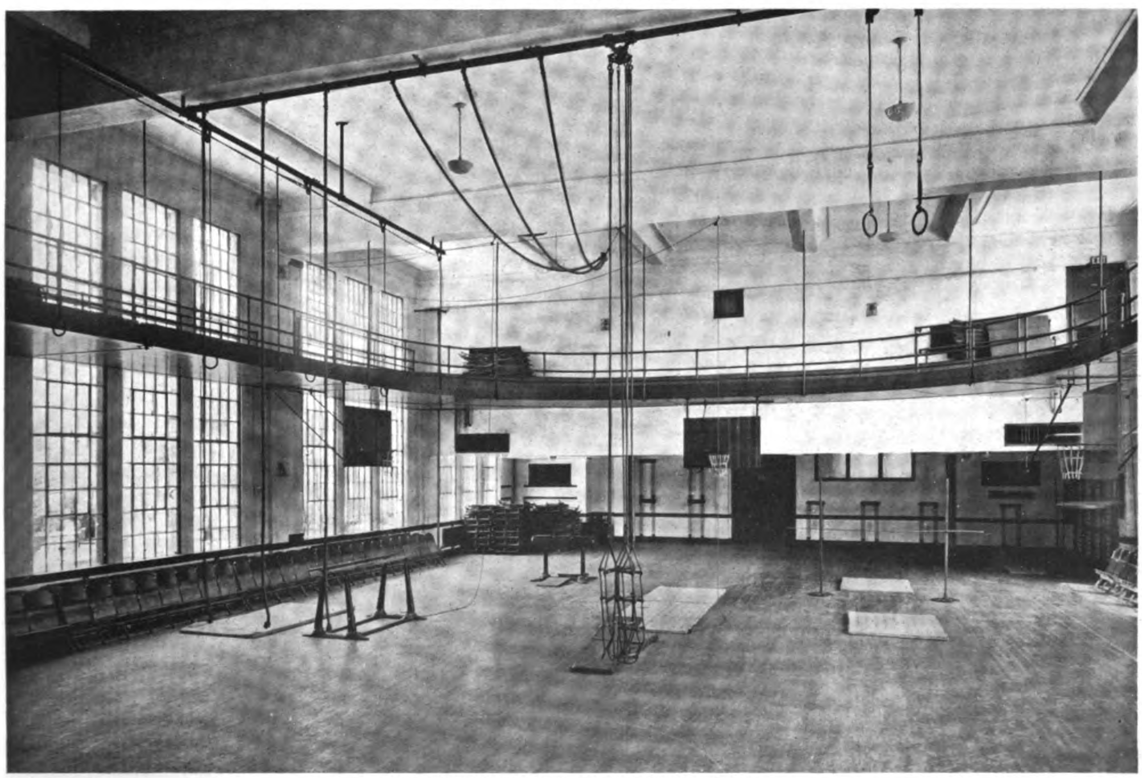
Second Floor Plan



Third Floor Plan



VIEW OF GYMNASIUM FACADE



INTERIOR OF AUDITORIUM-GYMNASIUM

BALDWIN HIGH SCHOOL, BIRMINGHAM, MICH.

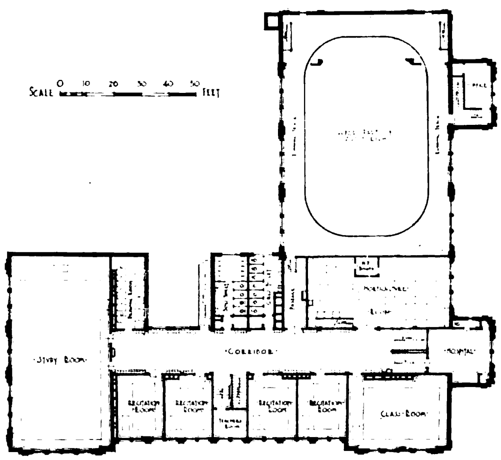
VAN LEYEN, SCHILLING, KEOUGH & REYNOLDS, ARCHITECTS

BALDWIN HIGH SCHOOL
BIRMINGHAM, MICH.

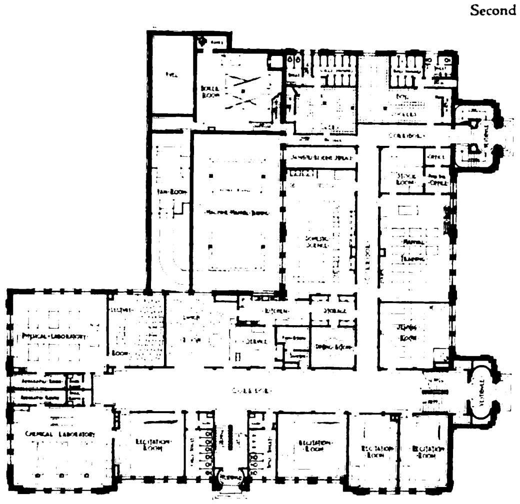
Illustrations on Plate 33

THIS school is constructed of rough surfaced face brick trimmed with terra cotta. It is of fireproof construction and is planned to be added to at the rear of the space occupied as a study room. A combination auditorium-gymnasium is included. Note two large study rooms required by the type of school administration.

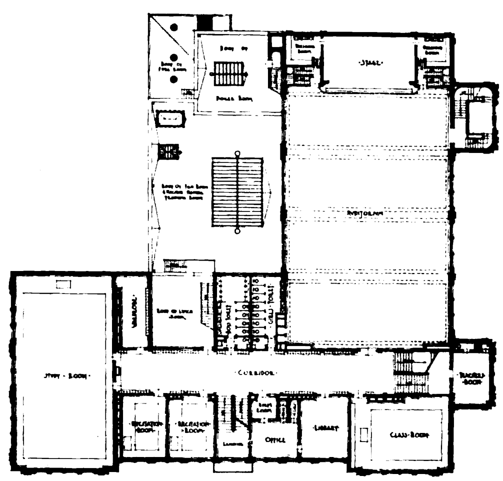
Heating by direct steam; ventilation by indirect method using fresh air room, plenum chamber, fans, etc. Erected in 1917 at approximate cost of 24 cents per cubic foot, or $417 per pupil for 600 pupils.



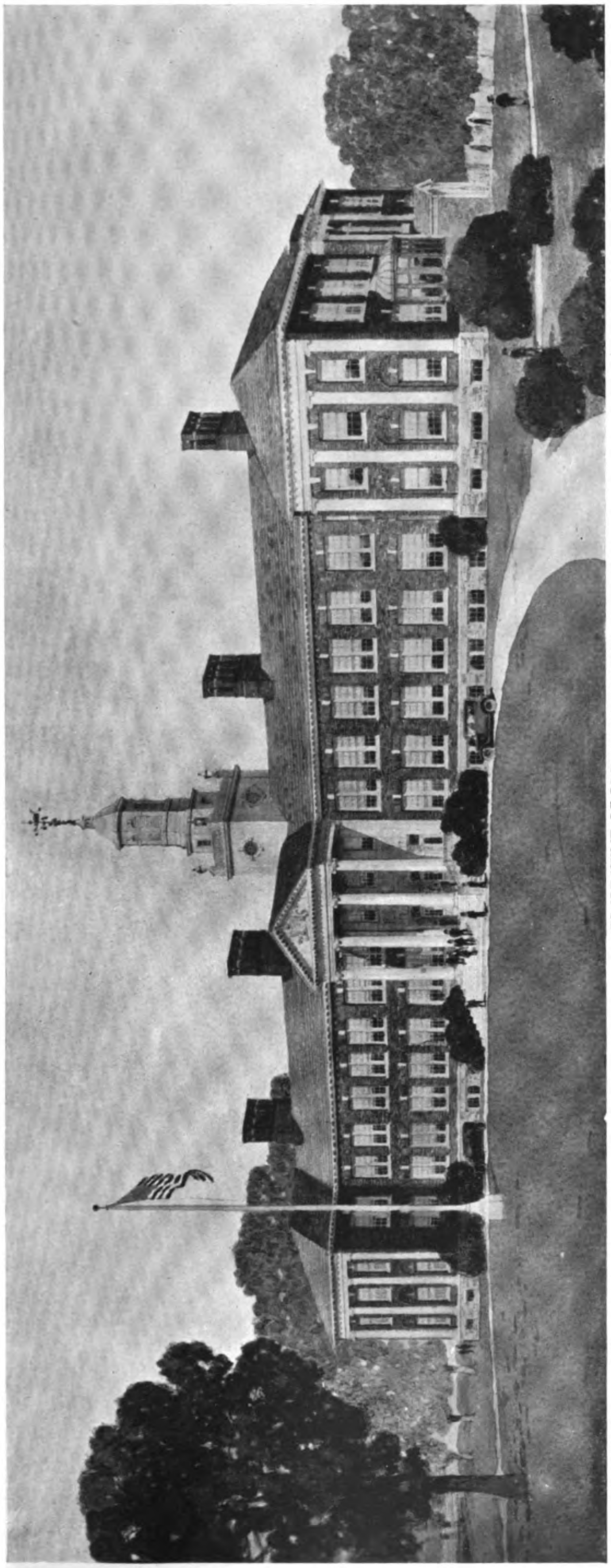
Second Floor Plan



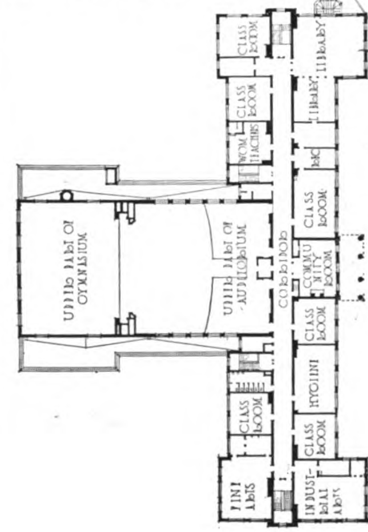
Ground Floor Plan



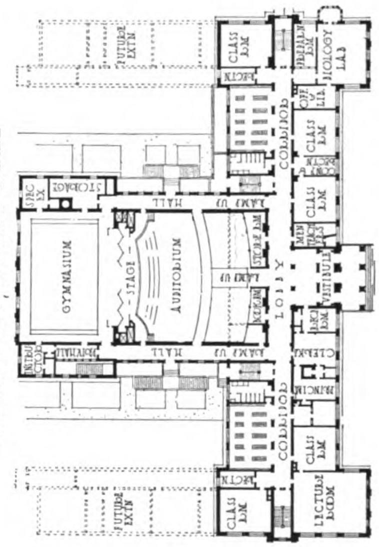
First Floor Plan



PERSPECTIVE OF PRINCIPAL FACADE



SECOND FLOOR PLAN



FIRST FLOOR PLAN

BASEMENT FLOOR PLAN

STATE NORMAL SCHOOL, GLASSBORO, N. J.

GUILBERT & BETELLE AND ARNOLD H. MOSES, ASSOCIATE ARCHITECTS

STATE NORMAL SCHOOL
GLASSBORO, N. J.

Illustrations on Plate 34

THE contract for this school was let in the spring of 1922 at a cost of $476,703.

The cubic foot cost was 37.2 cents.

The exterior of the building is face brick with Indiana limestone trim. The construction is fireproof.

School Building Construction Costs

By JAMES O. BETELLE, A.I.A.
Guilbert & Betelle, Architects, Newark, N. J.

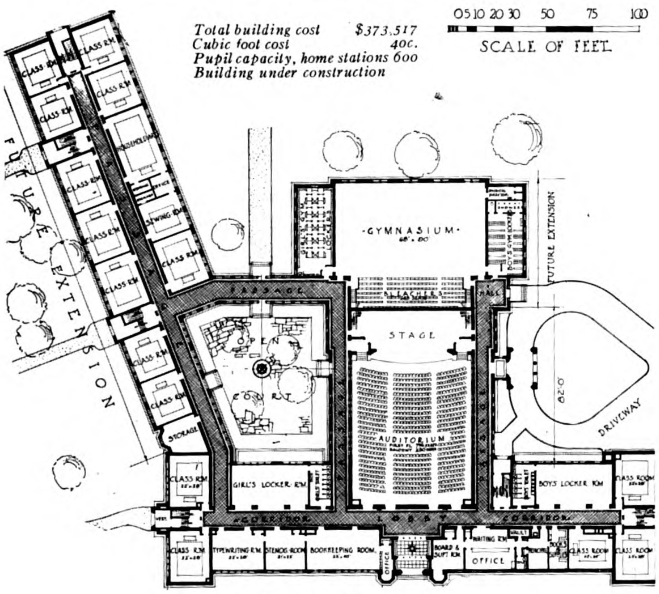
BEFORE the world war the architect interested in school building construction costs could draw upon the experience of years, during which prices were stable and cost data, covering numerous buildings of different sizes, construction and location, was available; it was therefore possible to predetermine very quickly and accurately the approximate cost of a given building in a certain location. This cost data, which was the accumulation of years, has all been swept into the discard and is of no use whatever excepting as a historical curiosity, showing how much we could build for little money in bygone days.

While we have passed the peak of high prices and have come considerably down the scale, prices are not stable and the pendulum will undoubtedly swing back and forth for some years to come, depending upon supply and demand. Therefore, no costs compiled at this time will hold good very long. At this writing (August, 1922) prices are stiffening and in the eastern part of this country they are about 10 per cent higher than they were three or four months ago. The cost of each building must be determined upon its own merits, and this is where the judgment, ability and experience of the architect come in for a severe test. In the class of public work, such as school buildings, it is absolutely necessary for the architect to keep within the appropriation available. Unlike private work, the amount appropriated cannot be easily increased at the option of an individual owner. No matter how small the extra amount needed may be, it must be formally and publicly voted upon, and this is not only difficult but often humiliating and embarrassing. It is encouraging to note that there is a marked tendency on the part of school boards to approach the problem of the cost of their proposed buildings in a more intelligent way than heretofore. The majority of them no longer guess at an arbitrary amount, such as they feel they would like to spend, but they call in their architects for guidance and advice as to the size of the buildings and their probable cost.

Too many architects are inclined to see how cheaply they can construct their buildings, without keeping in mind that cheap first cost always means deterioration and high upkeep charges later on. How much better it is to insist upon sufficient money's being provided or the size of the structure's being reduced, so that a building of the best construction can be erected! Schools are subjected to extremely hard usage and often to abuse. In addition to the use of the building for school purposes it is also used nights and Sundays for community purposes; only the most substantial and practical construction and finish will stand up under such excessive use. In an architect's early practice he undoubtedly has succumbed to the temptation or pressure to erect a building which has not the quality of materials which longer experience teaches him to insist upon. These early buildings are always a thorn in the flesh and appear time after time to plague and torment their designer. This is a plea to the younger practitioner to stand out for what he knows to be proper construction and not be sponsor for a building he will be ashamed to visit or to admit that he designed after a few years have passed. It is not only how *much* we can build for a given sum, but also how *well* we can build it. There is always a minimum below which no self-respecting architect will undertake the work. These facts are admitted by all and they are as old as the profession itself, but they are worth repeating in these days of high construction costs when the pressure for new buildings is so great and the temptation to undertake to do more than the funds will properly permit is almost irresistible.

To determine the probable cost of a school building from preliminary sketches and to keep a check on them during the period when contract working drawings are being prepared, several methods are familiar to the architect, although only the price per cubic foot approaches any degree of accuracy. It might be said that few if any architects make up a detailed quantity survey, price these quantities and arrive at the cost in this way. That method is too laborious, and other means are quicker and nearly enough correct to answer all ordinary requirements. Approximate estimates obtained from building contractors are not sufficiently accurate to be depended upon. Experience has demonstrated that the contractor cannot afford the time to do anything more than make a rough guess; he cannot be expected to obtain sub-bids and go through the routine of preparing a regular estimate when there is no contract in sight and when it is only done as a favor to the architect. Approximate estimates from builders are usually too high or too low to be of any use, so that in the last analysis the architect has to use his own judgment as to the cost of the proposed building, and stand or fall on the results.

In earlier days, when a school consisted of four walls and a roof, divided on the interior into classrooms of equal size, the cost was given as a certain amount per classroom. The question is still often asked, by educators who should know better, what schools are now costing per classroom. With the modern school building, containing an auditorium, gymnasium, locker and shower rooms, lunch room, large shops, study halls and rooms of varying sizes, it can easily be seen that it is not possible to use the classroom as a unit of cost. Sometimes schools have been quoted as costing a certain amount per square foot; this is also not a satisfactory unit to use as a



First Floor Plan and Perspective
Summit High School, Summit, N. J.
Guilbert & Betelle, Architects

measure of cost, because different schools vary as to ceiling heights and rooms; even in the same building, rooms vary in heights, as for instance, the auditorium and gymnasium. Cost per pupil is also difficult and misleading, as authorities have not yet agreed upon a uniform basis for counting the pupil capacity of schools with home stations and special rooms. It resolves itself into the use of the cubic foot as the only accurate unit of cost that will apply to any kind of building irrespective of its size or interior arrangement.

The other important factor governing the cost of school buildings is the type of construction. For the purpose of this article only two classes of construction are considered—fireproof and semi-fireproof. The usual fireproof type is understood to include masonry walls and floors, wood trim, and either a masonry or a heavy timber roof. There is not a great deal of difference in cost between a short span, reinforced concrete roof and one of timber, or at least not sufficient difference to materially affect the cost here given per cubic foot. The semi-fireproof building is intended to mean a building having masonry exterior and corridor walls and other supporting walls, but with stud partitions dividing individual rooms; floors in corridors and over boiler and coal rooms to be of fireproof construction, but all floors of ordinary classrooms as well as roof construction of heavy timber.

Information received in reply to inquiries sent out to leading architects who have fireproof school buildings under construction at this time indicates the cost for various localities to be about as given here, architects' fees not being included in these costs:

For the district around New York, fireproof schools are costing from 35c. to 40c. per cubic foot. A good building can be produced for 38c. It is interesting to note that the same type of building that costs 35c. and 40c. per cubic foot when built around New York can be built in the central part of New York state for 30c. to 35c. per cubic foot.

The work being done by the Bureau of Construction and Maintenance, Department of Education, New York, for the entire work costs 55c. per cubic foot. Of this amount 70 per cent of the total, or 38c., is for the general construction, and the remainder for heating and ventilating, plumbing and electrical work. This apparently high cost is due to the multi-story buildings and restrictive regulations applying to school buildings in New York, as well as to the excellent quality of the buildings erected.

The work being done by the Construction Department of the Philadelphia Board of Education is costing from 33c. to 36c. for the entire work.

Costs in the Chicago district are averaging 30c. per cubic foot for semi-fireproof construction, while fireproof construction is averaging 35c.

The cost of the schools built by the Construction Department of the Cleveland Board of Education was 15c. in 1912; in 1920 it reached the peak, costing 70c. per cubic foot, and in 1922 the cost dropped to 35c.

Costs of new fireproof schools for Columbus and the Ohio district generally are averaging 30c.

In the New England district semi-fireproof buildings are costing 32c. per cubic foot, while fireproof buildings cost 36c. to 38c.

No definite data was received from the middle west, but the California replies indicated that around San Francisco semi-fireproof schools cost 22c. to 25c., while fireproof buildings cost 30c. to 35c. per cubic foot. Replies from southern California indicate that the type of semi-fireproof building erected in that district is now costing from 22c. to 23c. per cubic foot.

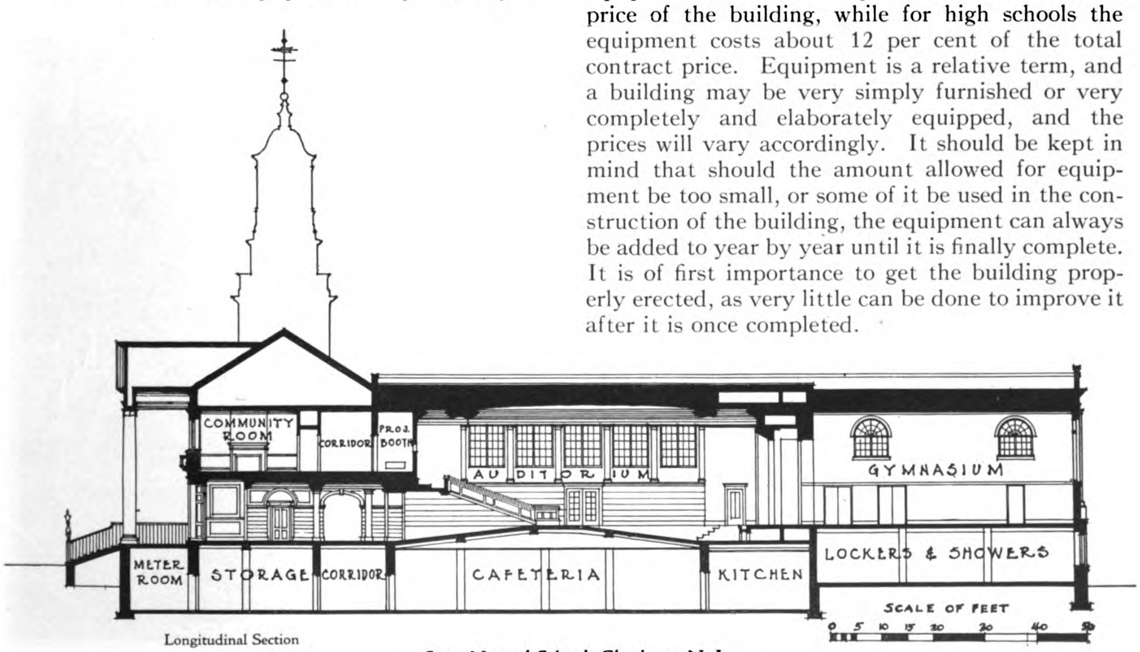
It costs slightly more to erect a high school than it does a grade school. This is principally on account of there being more plumbing, electrical work, heating and ventilating required in the special rooms, as well as the more elaborate and pretentious building required for a high school.

The difference in cost between a semi-fireproof and a fireproof building does not amount to as much as formerly, in these days of high priced lumber and comparatively low priced steel and cement. Practically all school buildings of any size are being built fireproof, excepting possibly the roof construction which makes it come under the class of a fireproof school building in some states. Roughly speaking, a completely fireproof building will cost about 8 per cent more than one which is semi-fireproof. Even in a so-called semi-fireproof building a great deal of the floors are fireproof, such as those of corridors, those over boiler rooms, coal rooms, manual training rooms and the like. It remains only to fireproof the floors of the regular classrooms, and the difference between the costs of a floor built of 3 x 14 joists and a reinforced concrete slab is not very great.

The mechanical equipment is practically the same in any school, irrespective of its type of construction or its costs. Obviously, it costs as much to heat a semi-fireproof building to 70° Fahr. in zero weather and to provide 30 cubic feet of fresh air per pupil per minute in a semi-fireproof building as it does in a fireproof structure when both are the same size; therefore it is often misleading to say that the mechanical equipment cost a certain percentage of the total cost of the building, excepting when the buildings are of the same quality. In a good type of fireproof building, costing say 40c. per cubic foot, the heating and ventilating will average 4½c., the plumbing 2c., and the electrical work 1½c. per cubic foot, the general construction making up the difference, or 32c., which all equal the total of 40c.

If, for the sake of argument, we wish to express the figures on mechanical equipment in terms of percentage on a 40c. per cubic foot fireproof building, the general construction equals 80 per cent of the contract, heating and ventilating 10 to 12 per cent, electrical work 3 and plumbing 5 per cent. In a cheaper semi-fireproof building these relative percentages would change; the mechanical equipment would increase in proportion while the general construction percentage would decrease. This is on account of installing the same mechanical equipment in a cheaper type of building.

With regard to equipment, the architect is often asked by the school board or the superintendent of schools how much to allow in their budget for equipment. It is quite an undertaking to itemize and price the equipment piece by piece, so that a quick rule for close approximation is often very useful. For grade schools it is found that complete equipment costs about 8 per cent of the contract price of the building, while for high schools the equipment costs about 12 per cent of the total contract price. Equipment is a relative term, and a building may be very simply furnished or very completely and elaborately equipped, and the prices will vary accordingly. It should be kept in mind that should the amount allowed for equipment be too small, or some of it be used in the construction of the building, the equipment can always be added to year by year until it is finally complete. It is of first importance to get the building properly erected, as very little can be done to improve it after it is once completed.



Longitudinal Section

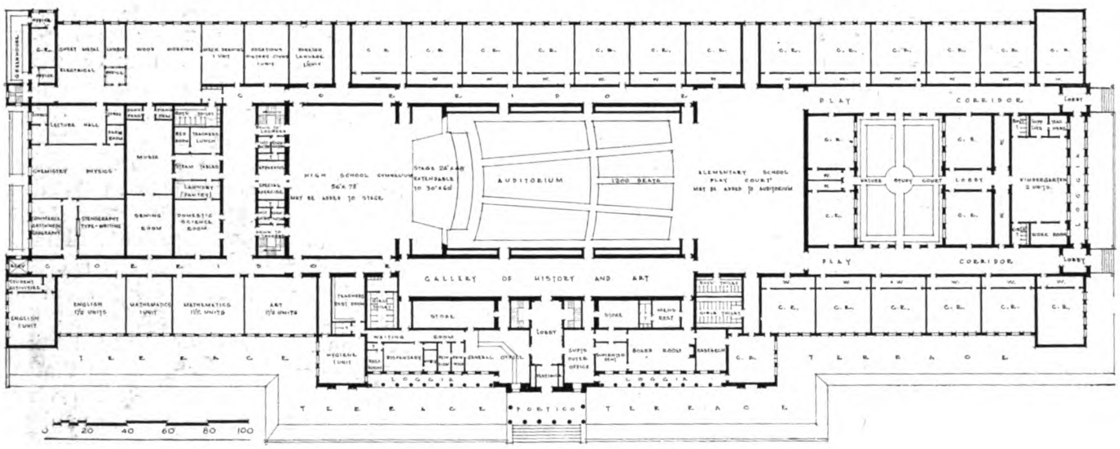
State Normal School, Glassboro, N. J.
Guilbert & Betelle and Arnold H. Moses, Associate Architects

The Handley School, Winchester, Va.

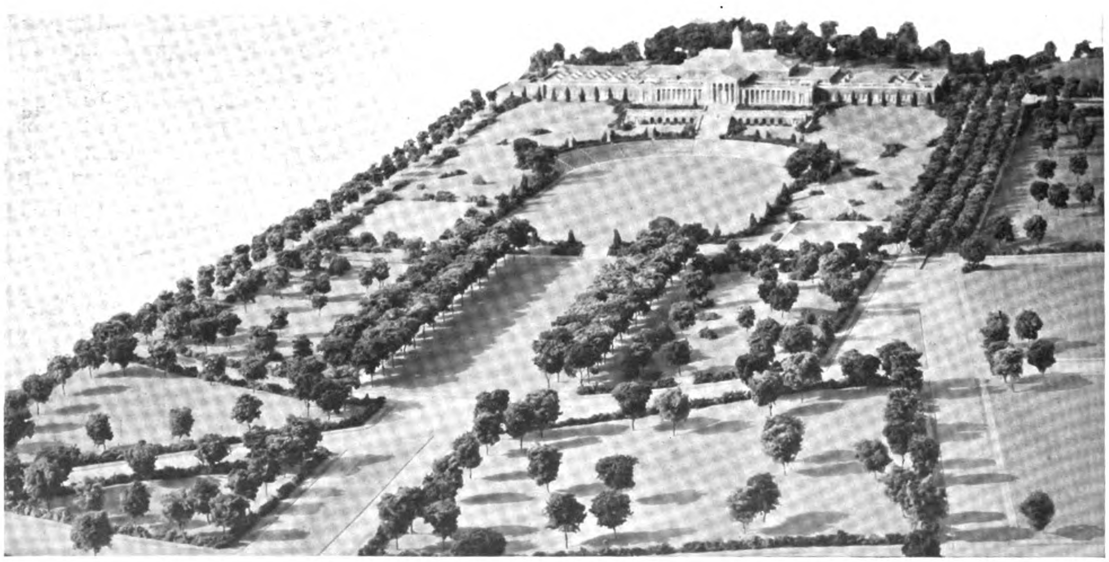
W. R. McCORNACK, ARCHITECT

THIS school, built from a bequest by the late Judge John Handley, is a memorial school conducted under the auspices of the local public school board, and is located in a tract of some 80 acres which is to be laid out with every possible provision for athletics, including tennis courts, an athletic field and stadium, wading pool, playgrounds for little children, golf course and a park for adults.

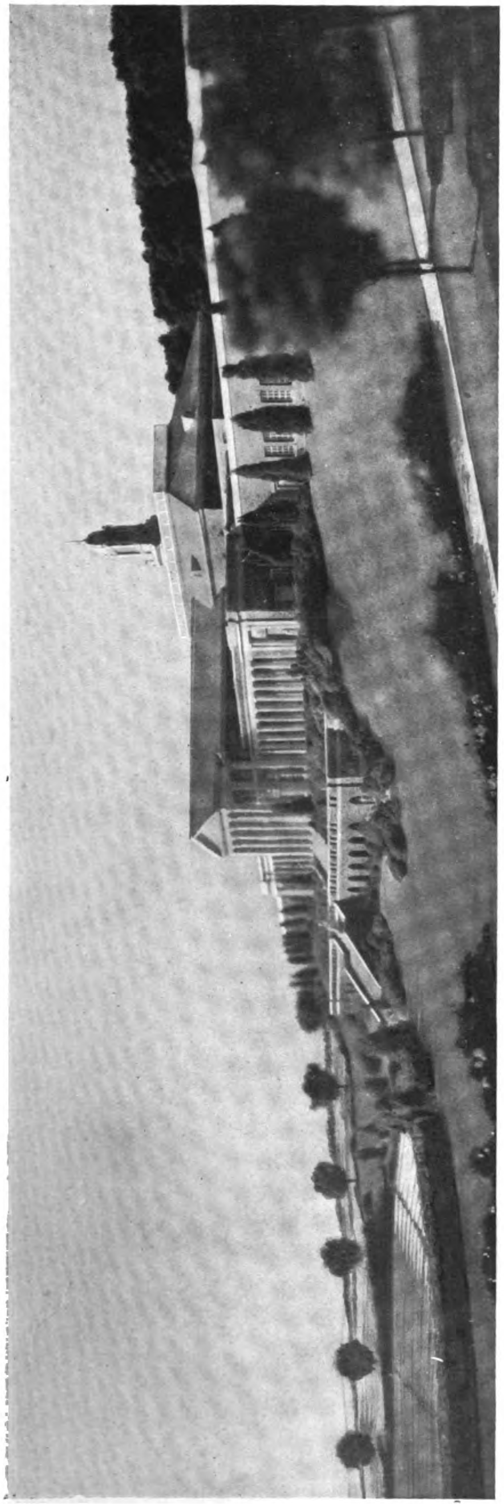
Within the school building, which is designed in the form of a letter H and on the one-story, unit plan, with an outside exit from each classroom, are taught the usual kindergarten, elementary, junior high and senior high grades, and in addition to the requisite classrooms with overhead light the structure includes the necessary laboratories, shops, an assembly room which seats 2,000 when extended to include the play court, and also a gymnasium, nature study hall, a swimming pool, cafeteria and a number of other adjuncts not often to be found in even the best equipped school building. Carrying out the wishes of its founder, the school is intended to be not only the most completely equipped of public schools but is also to be a community building so broad in its scope as to care for not only the regular school curriculum but to meet also the vocational and recreational needs of all the people in the community.

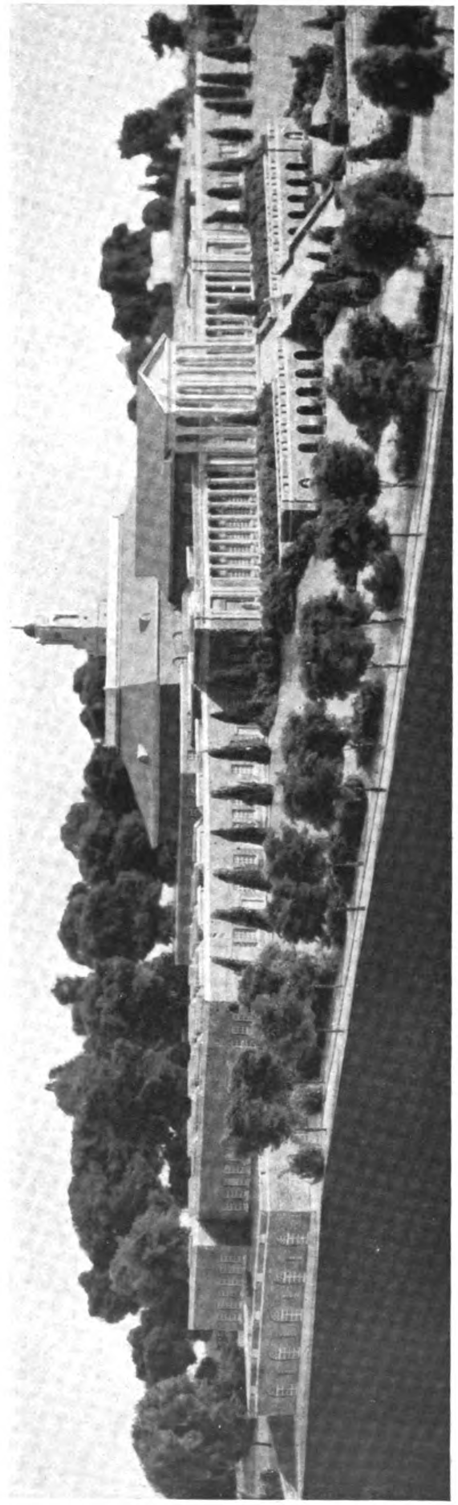


Ground Floor Plan of the Handley School



General View of Model Showing Landscape Treatment of Extensive Site





HANDLEY CONSOLIDATED PUBLIC SCHOOLS, WINCHESTER, VA.
W. R. McCORNACK, ARCHITECT
GEORGE FOX, ASSOCIATE ARCHITECT

Economics in Cleveland School Plans

BASED ON STUDIES OF W. R. McCORNACK, ARCHITECT FOR THE BOARD OF EDUCATION

By GEORGE M. HOPKINSON, *Associate Member, A.S.C.E.*

WASTE in the form of unnecessary expenditure of funds by various school boards throughout the country extends into millions of dollars, due to the fact that too little consideration has been given in the past to the application of economical principles of schoolhouse planning. The average tendency in a great many cases is to consider a school building as so many classrooms together with necessary corridors and stairs for gaining access to the various different rooms; whether space which is not actually used for instruction purposes can be eliminated is not as seriously considered as is the case when a commercial venture is undertaken, such as an office building, wherein the architect strives to eliminate every square foot of space that does not produce revenue or that is not necessary for the functioning of the building.

The matter of the waste of space in school buildings was brought to the attention of the school officials in Cleveland through School Architect W. R. McCornack of the Cleveland system, who took upon himself the task of thoroughly investigating the reasons for the difference in cost of two buildings which were bid upon at the same time, and contained practically the same building requirements, but so arranged that the layouts formed different types of schoolhouse design. This investigation revealed to the Cleveland school officials the secret of eliminating school building waste.

The school buildings referred to are the Empire and Rawlings elementary schools, which were built at the same time in the summer of 1914, when building costs were at their lowest pre-war ebb. These buildings are two stories in height, and both are of the same fireproof construction throughout and contain these departments:

Twenty standard classrooms.	Principal's office.
Kindergarten.	Auditorium, seating 500.
Manual training rooms.	Girls' playroom.
Domestic science department.	Boys' playroom.
Dispensary.	Swimming pool.
Two rest rooms.	Usual toilet facilities and heating plant.
Teachers' lunch room.	

It was suggested in the interests of economy that the Rawlings School be given much the more simple treatment on the exterior and that a common brick facing be used throughout, without any limestone trimming. This was done, and when the estimates were received the prices per cubic foot were thus figured:

Rawlings School, with common brick exterior, 15 8/10 cents.

Empire School, with more ornate exterior, 16 3/10 cents.

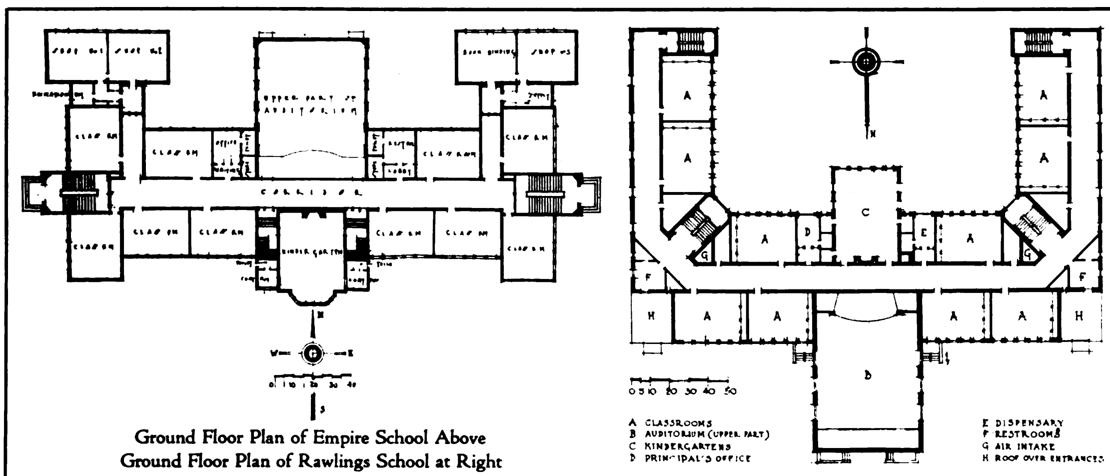
Further analysis of the estimates brought out the fact that the Rawlings School, showing the lower cost per cubic foot, indicated a cost of $15,640 in excess of the Empire School.

The research division of the architectural department immediately started to analyze the plans and obtained these results:

Total gross area of the buildings:	
Empire School	62,435 sq. ft.
Rawlings School	64,485 " "
Total area of corridors, lobbies and stairs:	
Empire School	10,386 sq. ft.
Rawlings School	22,976 " "

The investigation revealed the fact that the excess cost of the Rawlings over the Empire was due to the waste in corridors, stairs and lobbies.

The reader's attention is called to the accompanying plans and elevations of the two buildings under discussion. Investigations were continued in connection with other schools by gathering all available



Ground Floor Plan of Empire School Above
Ground Floor Plan of Rawlings School at Right

Entrance Front of Rawlings School, Cleveland

data and information bearing upon the question of saving space not actually needed for instruction purposes in school buildings. From a careful examination by measurements of every building in the Cleveland school system it was found that there are 1,250,000 square feet of floor space in Cleveland schools devoted to stairs and corridors. This is an area equivalent to 1,650 classrooms or enough to accommodate 62,400 children, and at the present cost of building construction it would require $30,000,000 to construct this number of classrooms. This is cited to show what a large amount of money could be used for providing space for instruction could a saving in corridor, stair and lobby space be brought about in standard schoolhouse design.

A study of a few examples of other types of buildings reveals the fact that hotels and office buildings have approximately 15 per cent of the gross floor area in stairs and corridors, while banks, stores and manufacturing plants, libraries and other buildings show a much smaller amount. It is to be expected that the percentage of space devoted to stairs, corridors and lobbies in hotels and office buildings should be large because of the small units contained therein, each of which must be reached independently, but at the same time school buildings are being planned with a much larger area of waste space. If an architect designed his commercial building with the same percentage of waste space that he does in a school building, he would not survive to design any more.

The architectural department of the Cleveland Board of Education has continued studies of the question with the idea of eliminating absolutely all waste space possible, and the result has been the development of these three types of building:

1. The one-story, corridorless, elementary school, with 8 per cent of the floor area in corridors.

(Similar to the Brett Memorial and Miles Standish Schools.)

2. The three-story, corridorless, elementary school, with 12 per cent of the area in stairs and corridors.

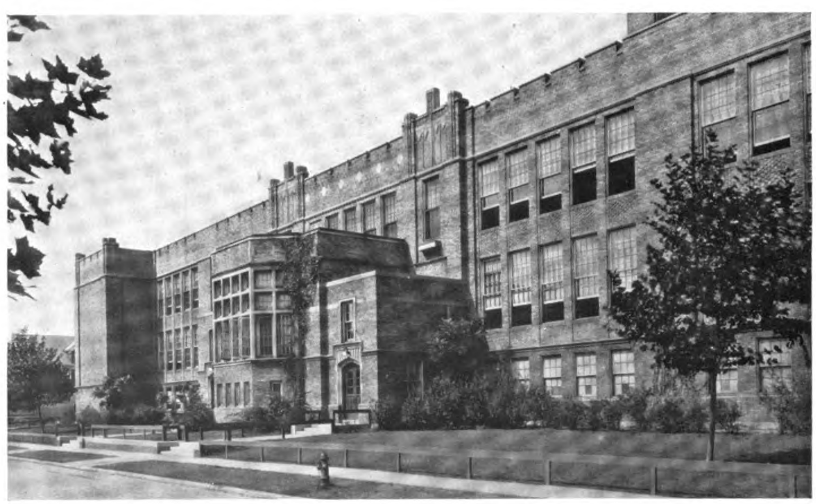
(No contracts have as yet been awarded for this type.)

3. Junior and senior high school combination one and three-story building, with 15 per cent of the floor area in stairs and corridors.

(Buildings of this type are under construction.)

Assuming 15 per cent to be the amount of unusable space lost in planning a school building, there would still be a saving of 10 per cent over the amount of unusable space in the Cleveland schools of the past. This means that 40 per cent of the 1,250,000 square feet of stair and corridor space in the Cleveland system could have been saved in the past and the space devoted to educational space. This is equivalent to 625 classrooms and represents seating accommodations for 250,000 children, and these 625 classrooms at present-day prices would cost $10,000,000 to build.

The first type of one-story buildings mentioned here will no doubt prove to be the solution of the elimination of waste and the first step toward an entirely new type of school building. The advantages claimed for this one-story type school are:

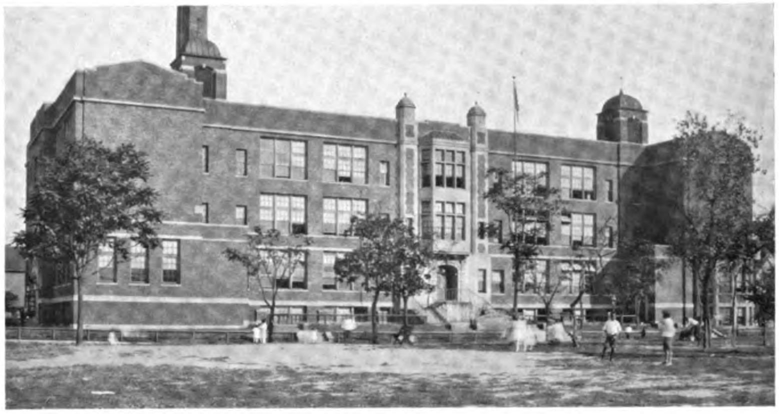


Entrance Front of Empire School, Cleveland

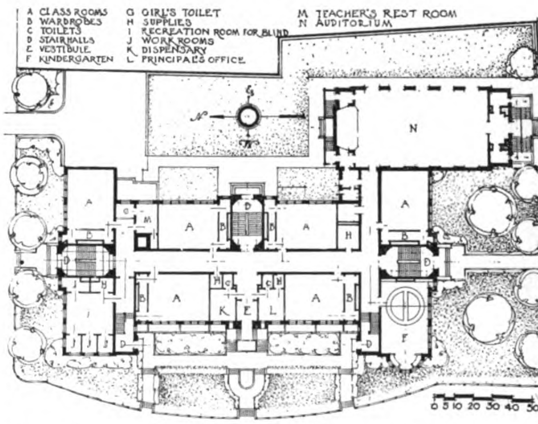
1. *Cost.* It was proved in Cleveland in August, 1918, when bids were taken for the Wm. H. Brett Memorial School and a duplicate of the Gladstone School, simultaneously, that the first type, one-story Wm. H. Brett School was the cheaper of the two.

The Wm. H. Brett School contains 24 classrooms,
Two play courts,
Auditorium, etc.

The Gladstone School contains 27 classrooms,
Two play courts,
Auditorium, etc.



Exterior and First Floor Plan of Gladstone School, Cleveland



The costs were:

	Wm. H. Brett School	*Gladstone School*
Cost per cu. ft.	38 cents	42 cents
Cost per classroom	$14,007	$18,876

The opponents of the one-story school idea have claimed that the bids for the duplicate of the Gladstone School were submitted by the contractors without going into careful detail, as they thought these bids were for checking purposes only; however that may be, it is an indisputable fact that the original Gladstone School was erected 13 months earlier, in July, 1917, at a cost of $16,072 per classroom or $2,000 in excess of the actual cost of the Wm. H. Brett School.

Additional facts are evident upon making a survey of two one-story buildings and two three-story buildings, and these figures are furnished for the purpose of comparison:

One-story types of buildings:

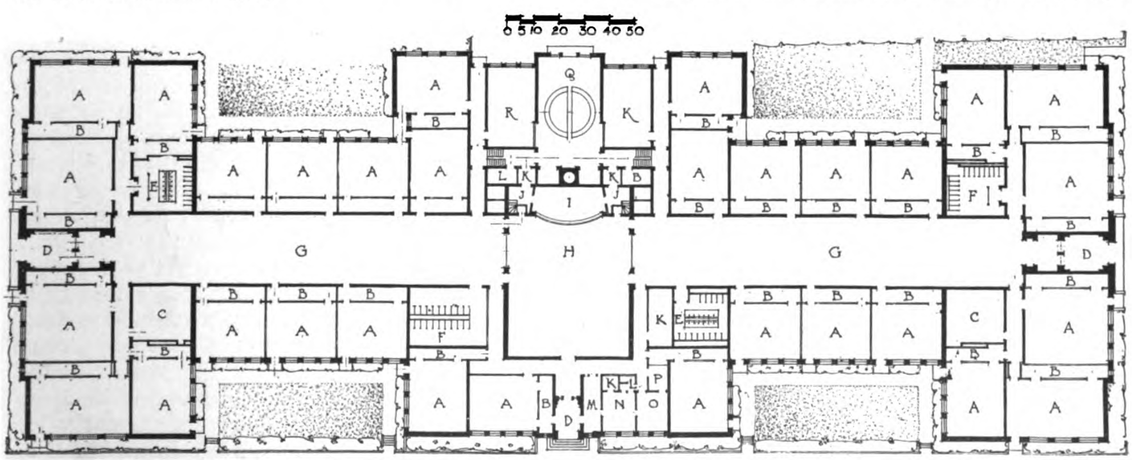
Wm. H. Brett School. .31,770 cu. ft. proportioned to classroom
Miles Standish . . . . . . .44,754 " " " " "

Other types of buildings:

Gladstone . . . . .44,340 " " " " "
Almira . . . . .45,325 " " " " "

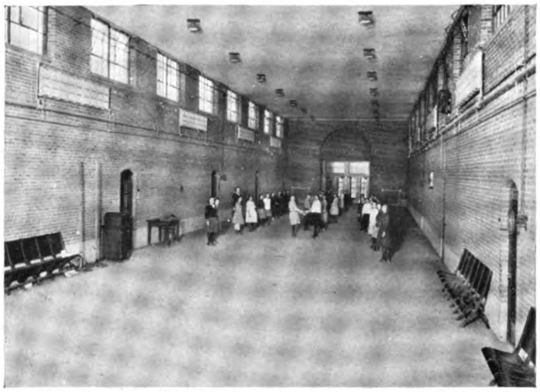
The figures given are arrived at by taking the total number of classrooms in the building and dividing them into the total cubic feet in the building.

The argument is also advanced that the cost of the land required for a one-story school is considerably in excess of the land for other types, which increases the total cost of the entire undertaking. However,



A. Classrooms
B. Wardrobes
C. Conference Rooms
E. Boys' Toilet
F. Girls' Toilet
G. Play Courts
H. Gymnasium
N. Principal's Office
O. Dispensary
P. Rest Room
Q. Kindergarten
R. Mezzanine

Ground Floor Plan of Wm. H. Brett Memorial School, Cleveland
Division of Architect, Board of Education, Cleveland
W. R. McCornack, Architect; George Fox, Associate Architect



Playcourt of Wm. H. Brett Memorial School

Playcourt of Miles Standish School

this point was investigated in the case of the Brett and the Gladstone Schools, and it was found that the difference in cost was very slight and that the additional land required to build the Brett School to cover same number of square feet of plot ground per pupil was only $7,500 more than the amount of land required to build the Gladstone School at the same area of plot ground per pupil.

2. *Safety.* The one-story building with the exits direct from each classroom to the ground is absolutely safe from fire and panic,—much more so than multi-story buildings.

3. *Administration.* The one-story building is easier to administer, and this fact is vouched for by those having charge of buildings of this type.

The distances may seem great on one floor, yet measurements were taken, starting at the principals' offices in both the Brett and Gladstone Schools, allowing a stop at the door of each room requiring supervision, and it was found that the horizontal travel in the Brett School was 90 feet less than in the Gladstone School, and that the vertical stairway travel in the Gladstone School was equivalent to climbing from the first floor of a 10-story office building to the top.

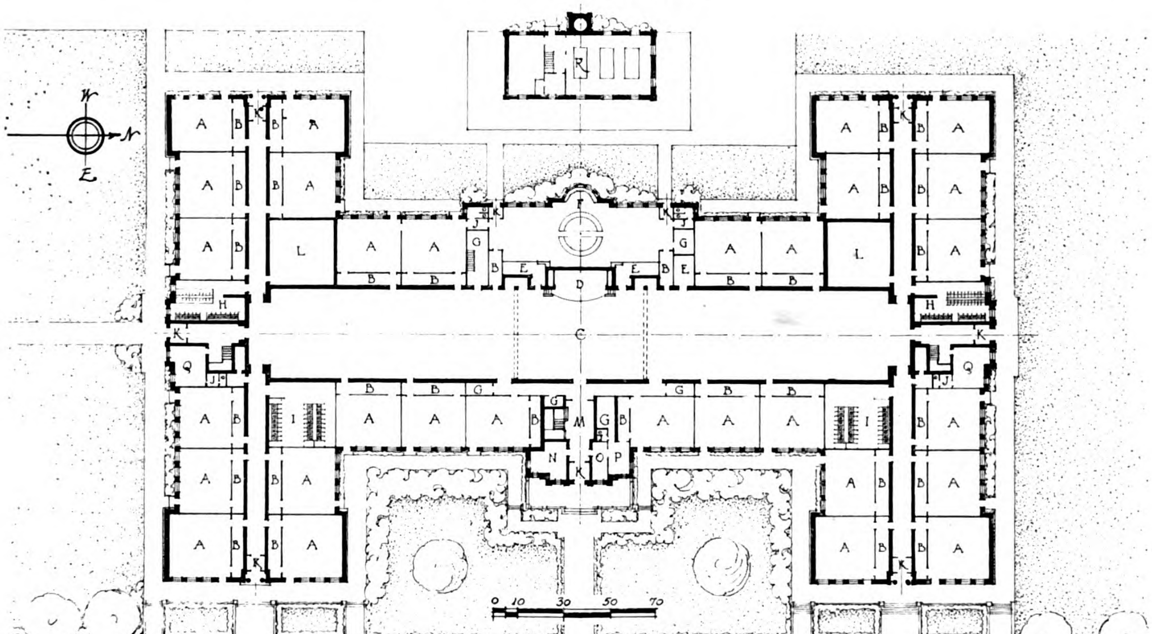
4. *Lighting.* The one-story type of building is much more adaptable to proper lighting distribution than any other type. For example, in the Miles Standish School there is a combination of top and side lighting in the classrooms, and curves plotted by illuminating engineers from tests made in both the Miles Standish and Gladstone Schools show conclusively that the light is practically uniform throughout at Miles Standish, while the opposite condition exists at the Gladstone School. To be able to reduce the size of the side windows, as was done in the Miles Standish School, is a great asset both from architectural and practical standpoints; this reduces the glare in the eyes of pupils next to the windows, and this reduction is only possible when top lighting is used.

There is a great saving in the cost of materials used in the construction of the one-story type of building, due to the fact that the materials used need only be of the semi-fireproof kind and not absolutely fireproof, as are required in a multi-story type. The semi-fireproof construction is, of course, absolutely justifiable on account of the direct exits at grade level from all classrooms. One-story buildings may have the exterior walls constructed of 4-inch exterior face brick, backed up with terra cotta wall tile; roofs of wood joists and sheathing. Interior partitions should be built of terra cotta partition blocks for the purpose of acting as a temporary firestop and for soundproofing qualities. Corridor walls should be of brick construction to act as bearing walls and firestops. Steel trusses should be used across the playcourts, with steel rafters.

It may be thought by some that there may be annoyance to classes receiving instruction, or interference with the use of the central auditorium, due to the noise from the interior playcourts which economical planning places within school buildings. This trouble, however, has been avoided by careful study. The ceilings of the Miles Standish School were designed to absorb all noise made by the children in the playcourts, and additional precautions were taken to prevent the passage of sound through the folding doors between the auditorium and playcourts, also by the use of sound-absorbing materials.

The suspended metal lath ceiling between the roof trusses was treated with the standard felt and membrane method of acoustical treatment, and the folding doors were built double with an air space between. The back faces of the panels of the doors facing the playcourt side were filled with felt and burlap, and the back faces of the doors on the auditorium side of the opening were covered with galvanized iron, the principle being that any sound that might pass through the first set of doors and not absorbed by the felt and burlap would be reflected by the galvanized backs to the felt surfaces. The Cleveland Symphony Orchestra has given a concert in the auditorium of the Miles Standish School with very satisfactory results from an acoustical standpoint. The playcourts and the auditorium are continuously occupied during all periods of the day, and each takes care of five classes. This means that the capacity of the school is increased at least one-third by this arrangement.

DETAIL OF ENTRANCE FRONT

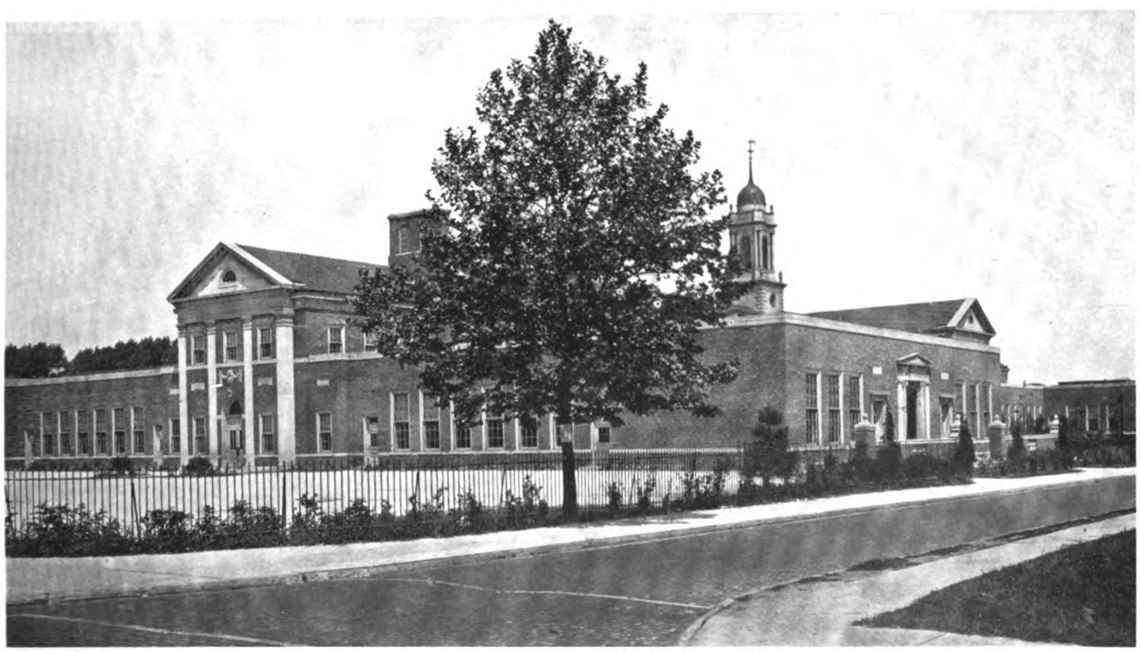


A. Classrooms
C. Assembly Play Court
E. Chair Storage
F. Kindergarten
H. Boys' Toilets
I. Girls' Toilets
L. Fan Rooms
N. Dispensary
P. Principal's Room
Q. Teachers' Room

MILES STANDISH ELEMENTARY SCHOOL, CLEVELAND

DIVISION OF ARCHITECT, BOARD OF EDUCATION, CLEVELAND
W. R. McCORNACK, ARCHITECT; GEORGE FOX, ASSOCIATE ARCHITECT

VIEW IN REAR COURT

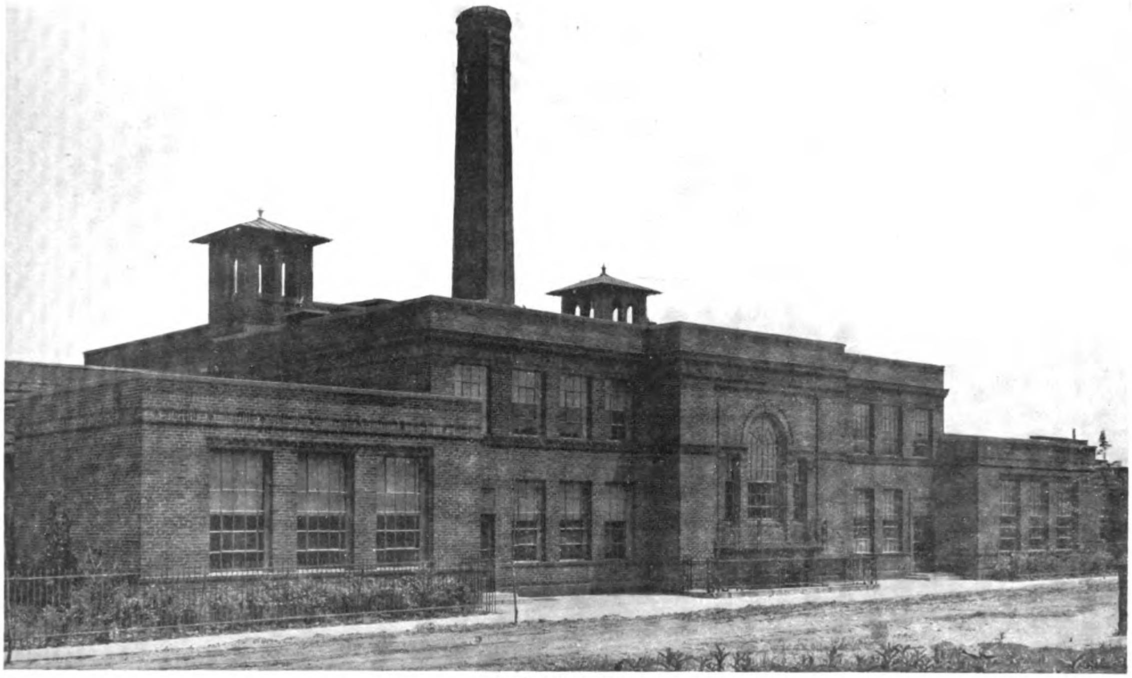


VIEW OF SIDE AND FRONT

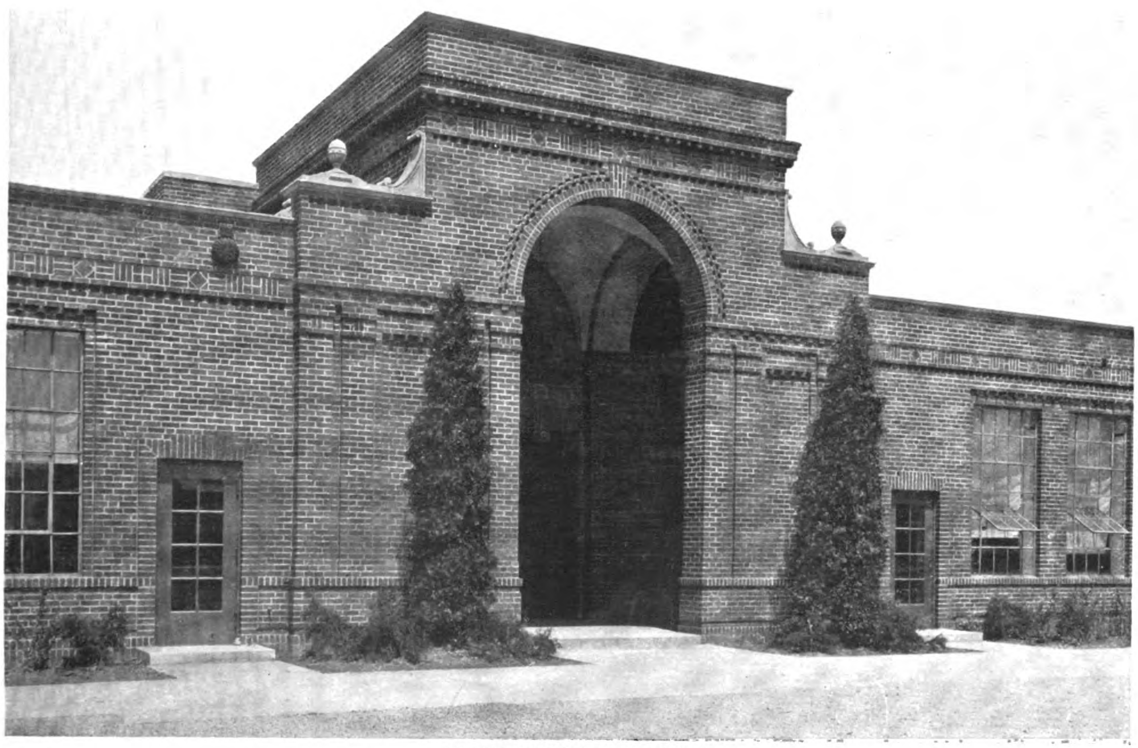
MILES STANDISH ELEMENTARY SCHOOL, CLEVELAND

DIVISION OF ARCHITECT, BOARD OF EDUCATION, CLEVELAND

W. R. McCORNACK, ARCHITECT; GEORGE FOX, ASSOCIATE ARCHITECT



VIEW OF SIDE



DETAIL OF ENTRANCE FRONT

WM. H. BRETT MEMORIAL SCHOOL (ELEMENTARY), CLEVELAND

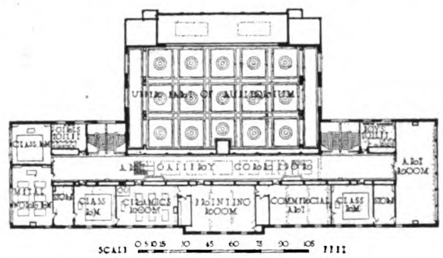
DIVISION OF ARCHITECT, BOARD OF EDUCATION, CLEVELAND

W. R. McCORNACK, ARCHITECT; GEORGE FOX, ASSOCIATE ARCHITECT

The School Building Program of Columbus, Ohio

By HOWARD DWIGHT SMITH, A.I.A.
Architect for Board of Education

THE magnitude of the public educational movement in our country may be realized when the size of its annual budget is considered. In Columbus, Ohio, for instance, the budget of the Board of Education is equal to the combined budgets of all other departments of city government. Public demand for educational advantages and public response to opportunities offered have made the business of public education one of the greatest of our governmental enterprises. The problem of providing housing for public instruction is not ordinarily the most important part of the school problem, but the curtailment of building programs during the world war has confronted many cities with such serious school housing problems that it will be years before any degree of "normalcy" will be reached in seating accommodations.



Third Floor Plan
Washington Gladden High School

The method of procedure adopted by the Board of Education of Columbus in its present building program, involving the expenditure of over $7,000,000, is perhaps unique. Seeking to avoid the mistakes which are so commonly made by boards of education, due not to wrong intent or lack of vision but to unfamiliarity with architecture and with building methods, the Columbus board proceeded to consult the local chapter of the American Institute of Architects before contracting for architectural service for the four new high schools which form the major portion of the present building program. While the plan suggested by the Columbus chapter was not adopted by the board, it is now recognized, by the architects and by the members of the board as well, that the open and frank discussions between them developed certain lines of thought in the minds of the board and presented to them certain fundamental ideas and ideals of professional service which the layman seldom grasps until too late. The Columbus board has for years maintained the office of School Architect for the performance of all architectural service and has realized the soundness of such a policy. When properly administered such an office provides efficient, economical service and assurance of continuous sympathetic study of local school housing problems and an opportunity for valuable co-operation between new building work and maintenance.

As developed to the present time, therefore, the essential features of the so-called "Columbus plan" are three:

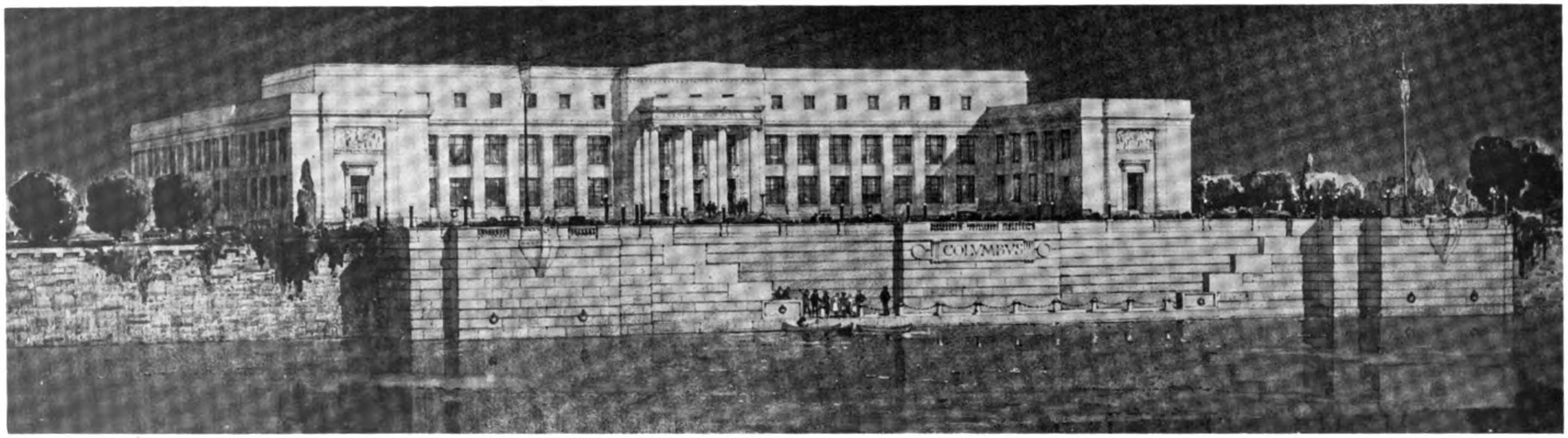
(1) The maintenance of the office of School Architect as a regular part of the school administrative organization, retained on salary to:
  (*a*) Act as professional adviser to the board and to all its administrative officers.
  (*b*) To be the executive head of the department; to design and superintend the construction of all building operations not specifically allocated elsewhere.

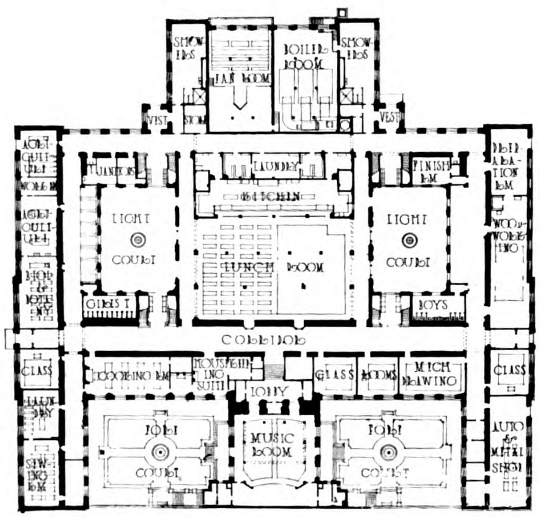
(2) The retaining of outside architectural service for certain large units of the building program, namely the four high schools, with individual responsibility in each case.

(3) Co-operation of study and mutual criticism on the part of architects retained for the various units.

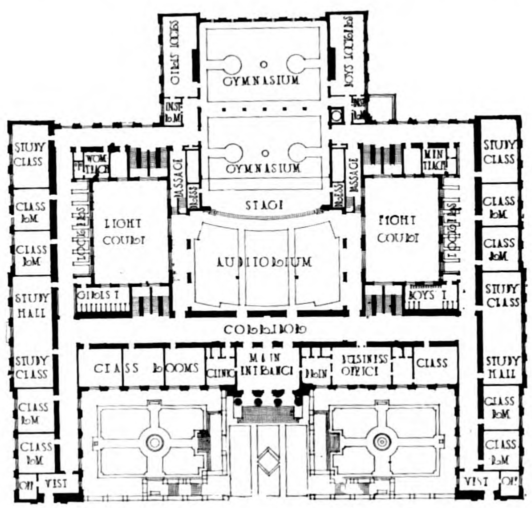
In making a choice of architects for these four large structures the board depended entirely upon independent information and knowledge of the experience and ability of the firms under consideration and not upon preliminary conferences with a long list of aspirants, a custom so commonly followed by many boards. These four firms have been chosen not only for their known ability as architects, but also for the possible merit of their contributions to the study and discussion of problems which would be common to all four schools. For the Washington Gladden School, in the new civic center, the board has retained Wm. B. Ittner of St. Louis; for the Joseph Sullivant School in the east section of the city, Howell & Thomas of Cleveland; for the Abraham Lincoln School on the south side, Richards, McCarty & Bulford of Columbus, and for the Edward Orton School, on the north side, F. L. Packard, also of Columbus. The contracts entered into with these four individuals or firms include not only the rendering of professional service on one particular building but require that each should co-operate with the other three, and with "such other persons" as may be designated by the board to study and advise on common problems. It is just this requirement which makes the "Columbus plan" unique. The criticism of one's professional efforts by another person not of one's own choice is not ordinarily relished by any practitioner, but the Columbus board's idea that the truth or the truthful solution of any problem will bear just criticism, led it to put into practice a plan which architects themselves would hesitate to suggest.

Of Mr. Ittner's ability as a school specialist little need be said. To say that the knowledge gained by his many years of experience is his most valuable contribution to the combined efforts of this group of architects is in no way to belittle his eclectic

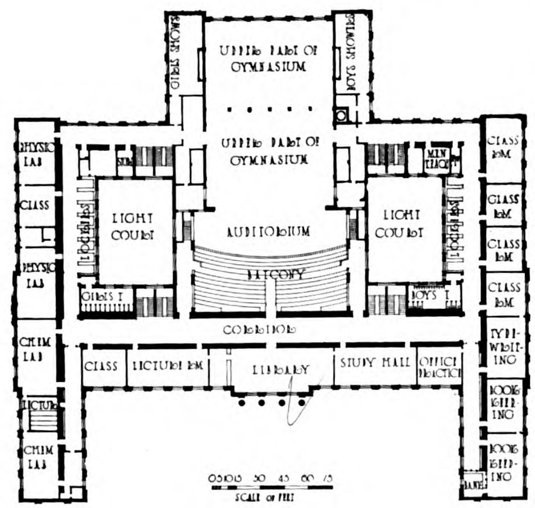




GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Total pupil capacity 2000
Auditorium capacity 1600

Total building cost $1,058,292
Cubic foot cost 27.05 c.

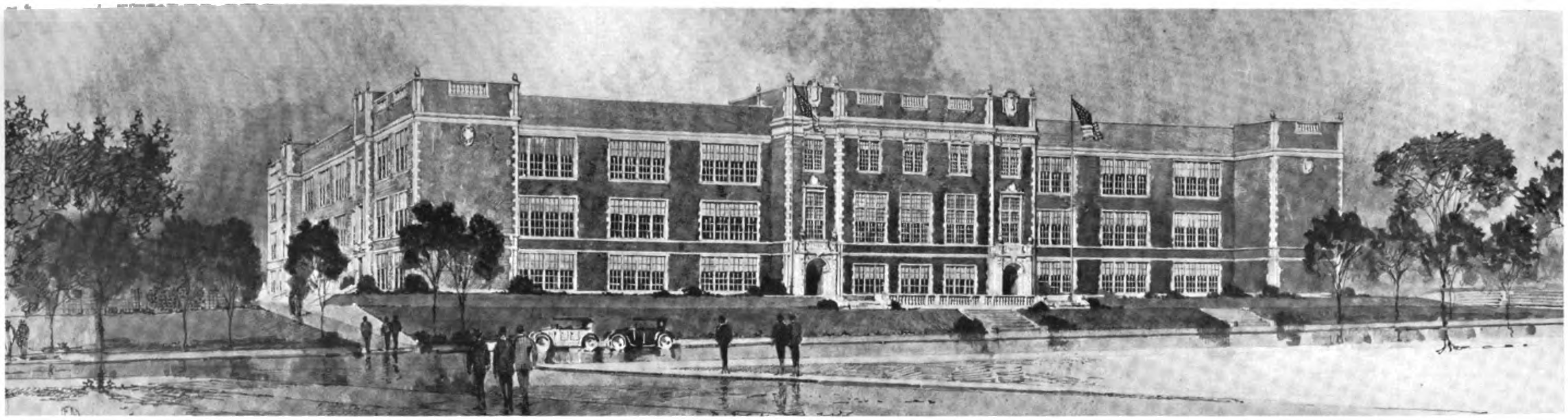
General contract 21.1 c. per cubic foot
Date of general contract June 19, 1922

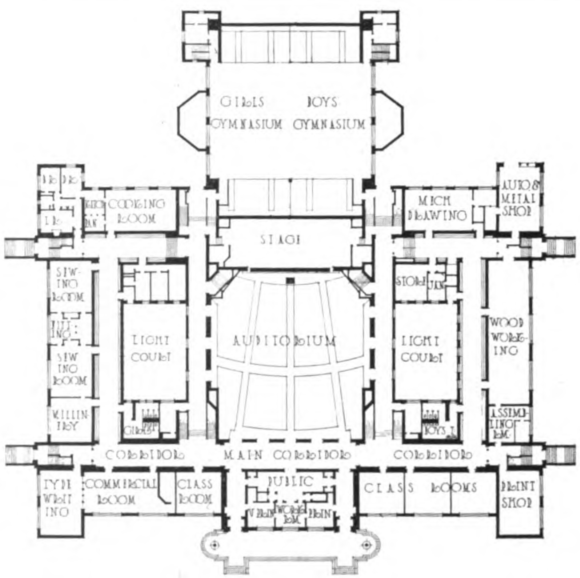
Exterior material, Indiana limestone
Construction, fireproof

Heating, steam
Ventilating, fan blast

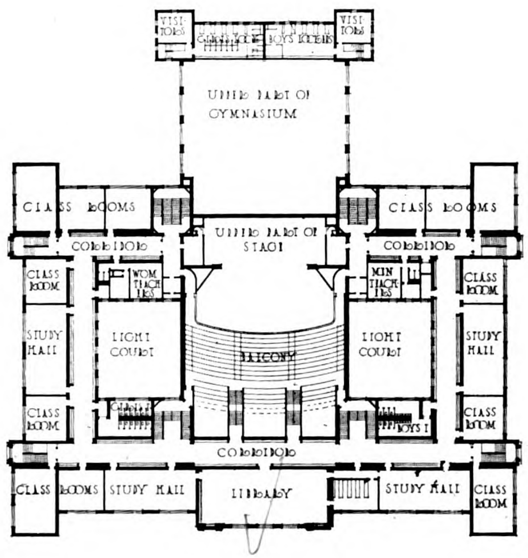
WASHINGTON GLADDEN SENIOR HIGH SCHOOL, COLUMBUS, OHIO

WM. B. ITTNER, ARCHITECT

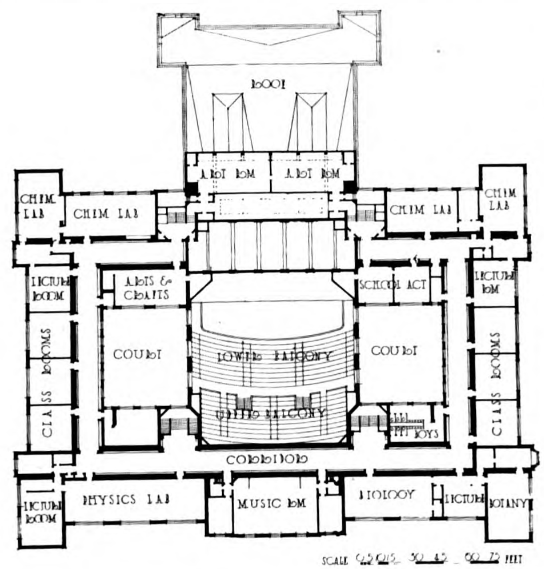




GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Total pupil capacity	2000	Total building cost	$818,311
Auditorium capacity	2000	Cubic foot cost	26.4 c.

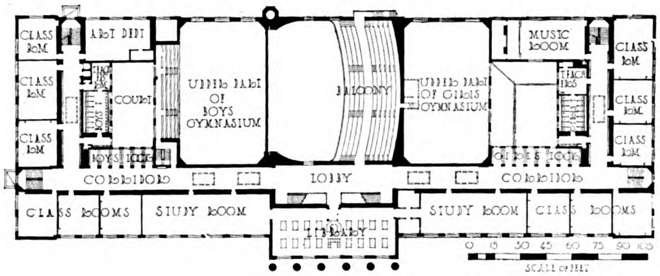
General contract cost 21.6c. per cubic foot
Date of general contract June 19, 1922

Exterior materials, red brick and Indiana limestone
Heating, steam
Ventilating, split steam, fans

EDWARD ORTON SENIOR HIGH SCHOOL, COLUMBUS, OHIO

FRANK L. PACKARD, ARCHITECT

ability. The simple, artistic ideals always maintained by Howell & Thomas in their work form not a small part of their contribution to the group. Their knowledge of, and sympathy with, local educational problems and building conditions together with their interest in all local civic enterprises on the part of Mr. Packard and the firm of Richards, McCarty & Bulford have given the board the benefit of professional advice of a very broad character. All of which is evidence that the board has sought local interest, expert advice and maximum of architectural ability.



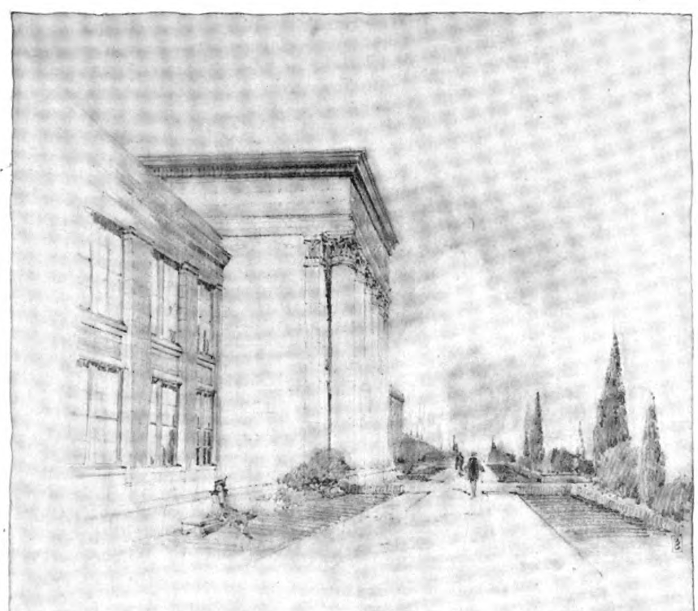
Second Floor Plan

Joseph Sullivant Senior High School, Columbus, Ohio
Howell & Thomas, Architects

Examination of the plans will show that they possess marked similarity in some respects and dissimilarity in others. It is felt that co-operation between the Board of Education, the administrative officers and the architects has resulted in sufficient standardization of plans where that has been deemed necessary for economy and efficiency, but has permitted the expression of architectural personality which is so much to be desired.

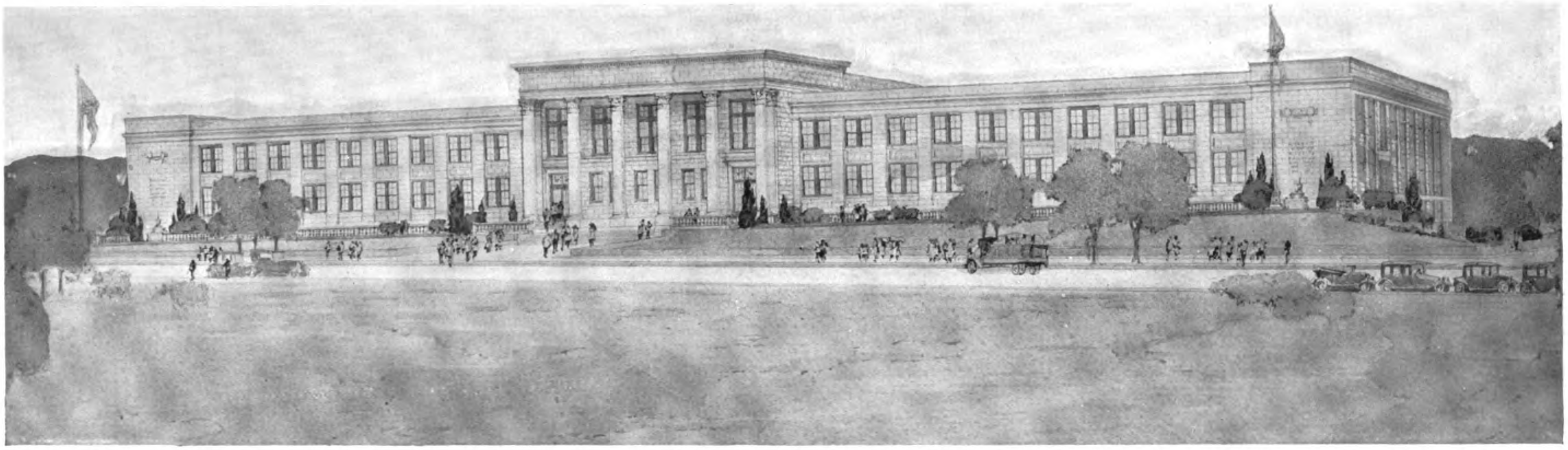
Not only has economical and effective planning been sought after in these buildings but the educational value of good architectural expression has not been lost sight of. Rather than compromise their position as leaders in the educational affairs of the community members of the board have insisted that the very exteriors of the buildings themselves should contribute to the education of the public. To this sentiment the architects have responded admirably, and it should not be considered an exaggeration of fact to state that they have again proved that architectural merit depends not so much upon the inordinate expenditure of money as upon simplicity, dignity, good proportion, pleasing color and exactitude of execution.

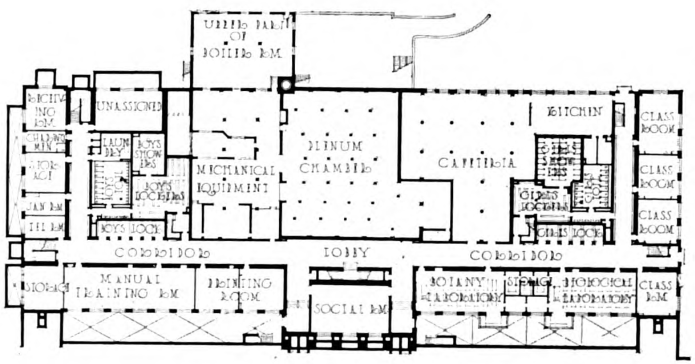
The Washington Gladden School is Mr. Ittner's first effort in the use of classic motifs in schoolhouse exteriors. This style, dictated by the location in the key position of a proposed group of public buildings, has been followed by Mr. Ittner in a manner worthy of his contemporaries who have been using it through years of successful practice. So also is the Joseph Sullivant School, built on a very restricted site along the chief residence thoroughfare of the city, in the classic style. The concentration of architectural interest in the powerful colonnade on the main facade simply accentuates the Greek simplicity and dignity of the whole conception. The Gladden and Sullivant Schools are valuable additions to the group of educational buildings in classic style to which belong the new buildings for the Massachusetts Institute of Technology, and like them are of Indiana limestone.



Pencil Sketch of Terrace and Portico of Joseph Sullivant Senior High School, Columbus, Ohio
Howell & Thomas, Architects

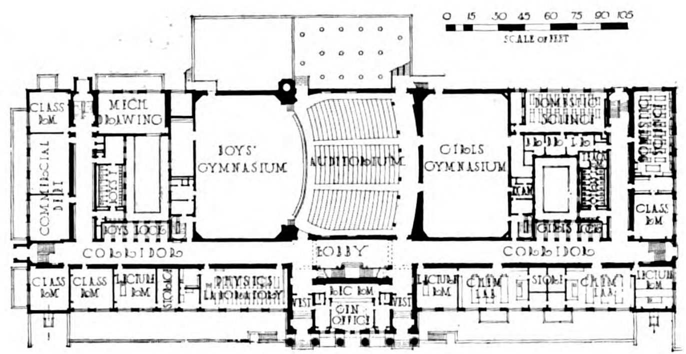
The brick and stone design of Richards, McCarty & Bulford for the Abraham Lincoln School is classic in that it follows regular modules of pilaster spacing and of fenestration. It does look somewhat to colonial precedent for its inspiration, and we see in its character something not unlike that found, for instance, in the Pennsylvania Hospital in Philadelphia. The Edward Orton School is the only one of the four which has taken advantage in any way of the broad fenestration suggested by Elizabethan precedent, which has been used with varying success in many contemporary educational buildings. The combination of brick wall areas with stone trim and quoinings is suggestive of the English buildings of the late Tudor period.





BASEMENT FLOOR PLAN

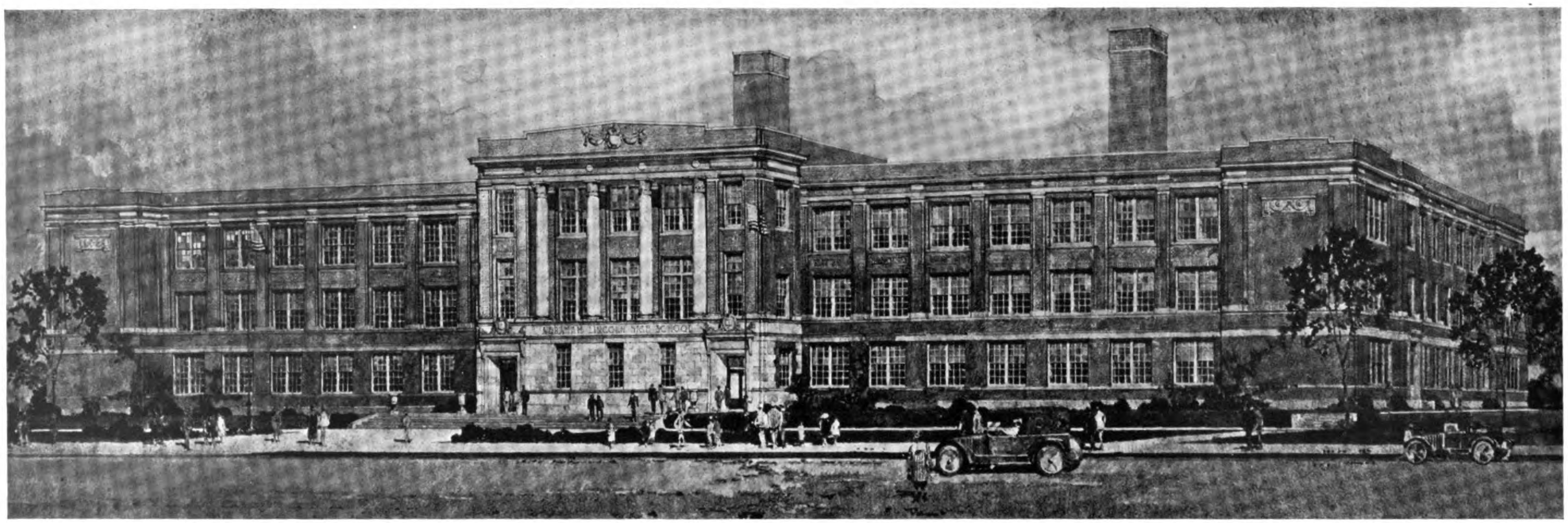
Total pupil capacity	1500
Auditorium capacity	1090
Total bldg. cost	$727,037
Cubic foot cost	30.3c.
General contract cost per cubic foot	23.5c.
Date of general contract	February 4, 1922
Exterior material	Indiana limestone
Construction	fireproof
Heating	steam
Ventilating	split steam fans

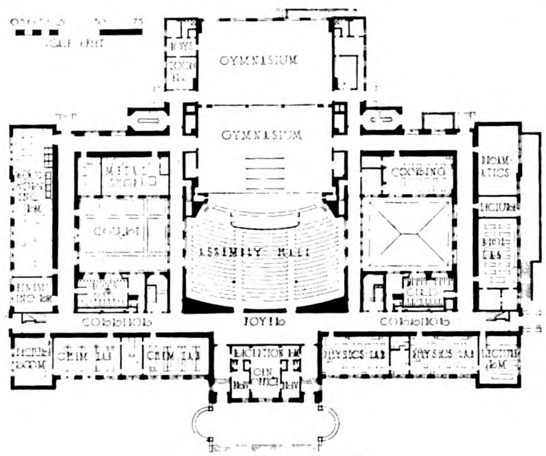


FIRST FLOOR PLAN

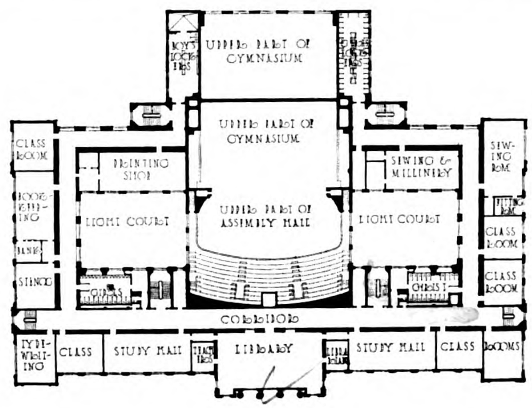
JOSEPH SULLIVANT SENIOR HIGH SCHOOL, COLUMBUS, OHIO

HOWELL & THOMAS, ARCHITECTS

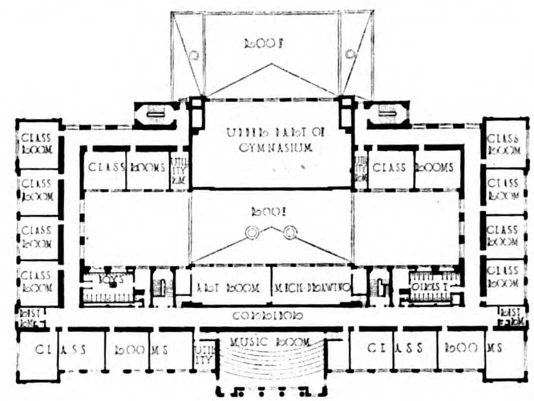




GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Total building capacity	2000	Total building cost	$691,259	General contract	20.09c. per cubic foot	Exterior materials, red brick and Indiana limestone	Heating, steam
Auditorium capacity	1325	Cubic foot cost	25.85c.	Date of general contract	June 8, 1922		Ventilating, fan blast

ABRAHAM LINCOLN SENIOR HIGH SCHOOL, COLUMBUS, OHIO
RICHARDS, McCARTY & BULFORD, ARCHITECTS

The Architect's Business Relations with School Boards

By C. STANLEY TAYLOR
Editor, Business & Finance Department

THE important problems occurring in the business relations of the architect and the school board involve points of both law and sound business policy. For practical discussion this relationship may be divided into several phases:

(*a*) Selection and appointment of the architect.
(*b*) Architect's preliminary services to the school board.
(*c*) The legality of the architect's agreement with the board.
(*d*) Agreement between architect and consulting architect.

In regard to the selection of the architect, we are informed that usually the board gives serious consideration to several organizations which by reason of past performance and special knowledge seem particularly well equipped to carry out the work. The element of favoring home talent to the exclusion of experience sometimes appears strongly. Here the decision must be based on sensible judgment by the board. What is expected as architectural service? Is the building involved in the nature of its requirements? Is the value of specialized experience and knowledge given the weight which it deserves?

The logical decision on the part of the school board would seem to be the retaining of an architect experienced in this field. If there are good local architects, however, it may be both impolitic and unfair to bar them entirely from participation in the work because they are lacking in experience in this field. The expedient is often adopted by a school board of commissioning a local architect to carry out the planning of the new school building, but with the understanding that a selected school expert will be employed as a consulting architect. This method has in many instances been proved successful and has certain advantages in combining the knowledge of local building conditions, material sources and sub-contractors with the experience of the school specialist. The local architect is also in a favorable position to supervise the work. Where an architect who has had no previous experience in school work is commissioned to plan a new building of this type he will find it the course of wisdom to engage an experienced associate architect or a consultant. There is no excuse today for the designing of any institutional building which is not efficient of purpose, and specialized knowledge is an absolute requirement for the introduction of this important factor.

The contract between architect and consulting architect should be carefully drawn and the duties of each thoroughly defined. Broadly, the consultant, being generally a school specialist, outlines the design, plan, general details and specifications, based upon consultations with school officials, the requirements of the school administration and the consultant's familiarity with advanced practice in school building, turning over to the architect a complete set of sketch plans and outline specifications which have received the approval of the proper authorities; the development and carrying out of the plans are the part of the architect who is more intimately connected with the work. It should be noted that the consultant is in no wise responsible for the actual working drawings or for building supervision, but he is expected to co-operate should his advice be required during the preparation of drawings and specifications. The matter of remuneration should also be well understood; a consulting architect may receive a fee, generally 1 per cent of the estimated cost of the building, or payment may be in the form of a lump sum, and the dates and amounts of payments should be made part of the contract.

Among the details of any contract between two architects associated in a building operation is usually one which provides that a special joint bank account shall be opened by the associates and that all moneys received for work done shall be deposited to the credit of this account and drawn against only by cheques signed jointly; another provides that books of account shall be kept by both parties to the agreement showing the amount of time spent by each employe on the work and all expenses incurred, each submitting to the other a monthly statement of such expenses and costs; still another detail provides that a special nominal hourly charge be agreed upon for the time of the principals. One provision often made calls for the appointment of an arbitrator to decide any disputed point, and another provides that in case of the death of either party to the contract a final settlement with his estate will be made for all expenses and profits to the time of his death.

Some school boards still insist in employing the old method of selecting an architect, which consists of asking a number of architects to appear at a meeting of the school board and to submit sketches of a school building such as they can build for a certain sum (which amount is always too small). Those who are familiar with the undignified situation of a number of architects' patiently waiting in an anteroom for their turn to consume 15 or 20 minutes of the board's time cannot but feel the humiliation of it all. An impossible proposition confronts the architects, in the first place, as the school usually cannot be built for the money, and the architect who is willing to stretch the truth the farthest by making the most extravagant promises usually gets the job, and then his troubles begin. It is admitted that for the architect to obtain the work he

must interview the school board, but there are ways that this can be done and still keep one's self-respect, and increase the respect the school board might have for architects generally.

A very important phase of this relationship is the preliminary service which the architect can render to the school board. Often before an appropriation for a new school building can be made (or an old appropriation increased) it is necessary to influence favorable public sentiment. Again, there may be involved a problem of selling locally a bond issue in order to finance the project. In such instances, long before the money is provided for the new building, the practical assistance of the architect will be found invaluable. He can assist in selecting the site. Sketch plans and cost estimates of the new building must be prepared and presented to the public in an interesting and understandable manner. Public sentiment must be often influenced in favor of the basic idea of increasing local educational facilities. Throughout this publicity campaign the architect can assist materially by providing information as to what has been done in similar communities and by suggesting the logical solution of the local problem. Interesting data of this nature can be supplied to the local newspapers.

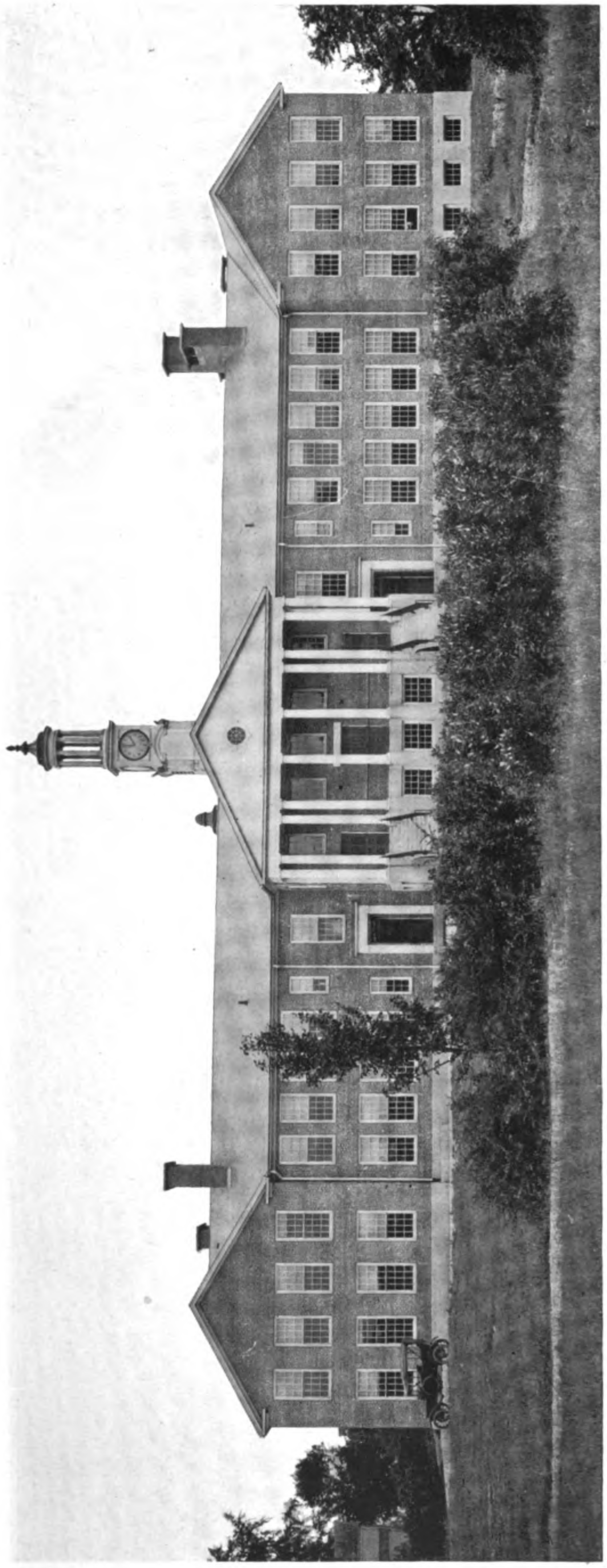
The superintendent of schools can usually compile the general publicity material, and the architect helps by supplying cost data, preliminary plans, and a perspective of the building suitable for reproduction in newspapers or in pamphlets for general distribution, the cost of this work to the architect being included in the amount it was agreed to pay him for preliminary services. The pamphlets or newspaper articles give the costs of similar buildings erected or under construction in nearby towns, together with comparison of tax rates, per capita wealth, bonded indebtedness, etc., in order that the citizens of the district may have an intelligent understanding of what they are being asked to vote upon. The architect in rendering these preliminary services should protect himself as well as the school board by recommending that sufficient money be appropriated to properly erect the building, to take care of roads, paths and landscape work, architects' fees and something for contingencies. This will all amount to a sum greater than the school board anticipated, and here again the ability of the architect is tested in order to convince the board that his figures are correct and that the work cannot be properly done for less money.

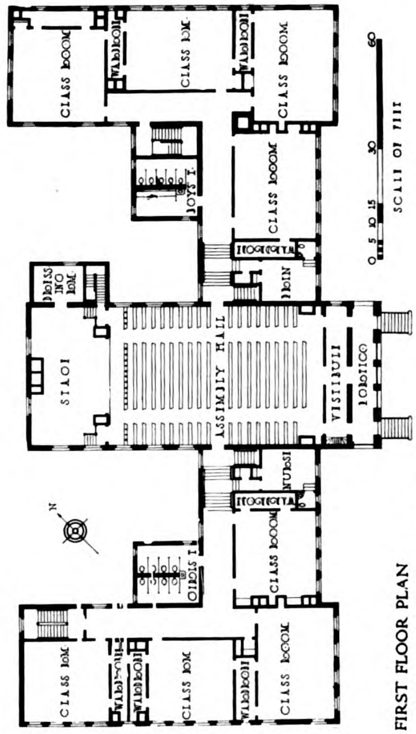
Two legal points which should be definitely covered include the fixing of the exact amount which the architect is to receive for these preliminary services, and the protection of the architect so that he is commissioned to carry out the entire project even though there be some lapse of time between the performing of preliminary work and the final decision to build. Under a general agreement where the architect's fee is on a percentage basis it is, of course, possible to arrange for the payment of 1 per cent of the total estimated cost as the payment for preliminary work and sketch plans. It seems to be more generally satisfactory, however, to arrange for the payment to the architect of a lump sum which may vary from $1,000 to $5,000 for preliminary work. A definite agreement should set forth clearly what work the architect is to do for this sum; it will usually include the furnishing of sketch plans, the cost estimates and general data for publicity purposes. During this stage of the work the architect will not expect much profit but estimates a lump sum to cover the approximate cost to him. In this preliminary work agreement should be included a general agreement on the entire work which will definitely express the fact that the preliminary work is but one stage of the commission for the complete planning requirements. The contract form used by one architect names three years as the time during which his contract as architect holds.

The legal questions involved in the relations between architect and school board are highly important. These relate to the fact of employment, the conditions of employment, and the terms of payment for architectural service. In view of the peculiar legal status of school boards, the possibility of changed personnel, and to avoid all possible friction on the point of authority, no architect should undertake school work without a written agreement or contract.

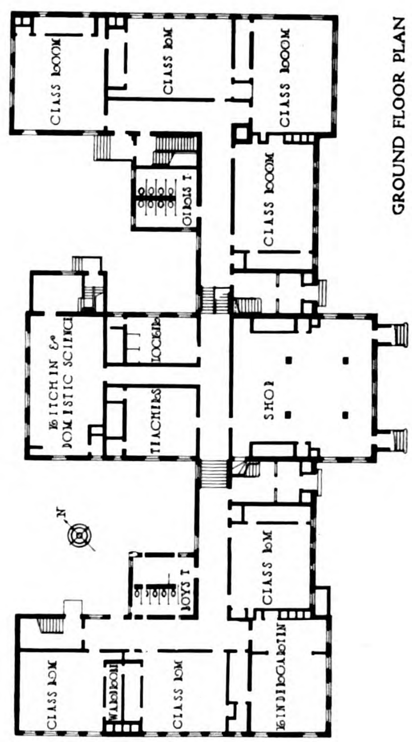
In order to demonstrate a few of the more obvious legal pitfalls involved we will quote the opinions of William Law Bowman, member on legal questions of the Consultation Committee of THE ARCHITECTURAL FORUM. These opinions apply generally to the employment of an architect by municipal corporations and are significant in considering his relations with school boards. The most important points are to be certain that the legal power to contract for such service exists and that duly authorized signatures appear upon a properly drawn contract.

"Under most county and village laws and city charters, no contract is valid or legal unless there has been a prior appropriation for the work. This technical requirement is often so strictly construed as to work the greatest injustice, as is shown by the actual experience of the writer in one of his cases. An architect had been given a signed and sealed contract by the authorized city official to draw plans for a certain building and superintend its construction. The contract had attached thereto the requisite certificate of the head of the department that the estimated cost was a certain amount, chargeable to a certain fund previously appropriated, and also a certificate of the comptroller that there was at hand an unexpended balance sufficient to pay the estimated amount for the work contracted for. The facts were that there had been an original appropriation by the proper board of $18,000 for the work. The architect found upon investigation that in order to have the building conform to other structures of a similar character in the city it would require about $30,000. The appropriating body was asked to appropriate the additional $12,000, but





FIRST FLOOR PLAN



GROUND FLOOR PLAN

BIRD SCHOOL (ELEMENTARY AND JUNIOR HIGH), WALPOLE, MASS.

R. CLIPSTON STURGIS, ARCHITECT

BIRD SCHOOL, WALPOLE, MASS.

Illustrations on Plate 39

THIS school is devoted to all grades of pupils, from the kindergarten through the junior high school. It was completed in 1921 at a cost of $145,000. It accommodates 578 pupils, making a building cost per pupil of $233.

The construction cost was about 28 cents per cubic foot.

The exterior walls are of selected common brick with wood trim. The construction is of second class with fireproof stairs and corridors. Ample exit facilities are provided.

DETAIL OF ENTRANCE FRONT

BIRD SCHOOL (ELEMENTARY AND JUNIOR HIGH), WALPOLE, MASS.

R. CLIPSTON STURGIS, ARCHITECT

took so much time in so doing that the head of the department, believing the work essential and necessary, decided to take the additional moneys required from his general department appropriation Said determination was shown by the contract and approved by the comptroller by his certificate thereto attached. Thereafter the preliminary plans were drawn and approved and the 1 per cent due the architect paid out of the two funds by the comptroller of the city. After the working drawings and specifications had been completed, the work was abandoned, chiefly on account of the death of the official having the work in charge, and the city thereupon refused to pay the balance due the architect for the work actually done and completed by him. An action was duly brought to recover the balance, and upon the trial the case was dismissed upon the ground that there was no specific appropriation of $30,000, the estimated cost of the work. So it was that the architect lost not only the value of his services and work actually performed, but court costs and his own legal expenses. The fact that the actual appropriation of $18,000 was still untouched in the city treasury and sufficient to pay his claim, and the further fact that the acceptance and retention of the work and the payment by the comptroller of part of the contract price would seem to constitute a ratification or at least to create an estoppel against the city, availed nothing. However, this merely verifies the strict rule which is carried out by courts for such governmental bodies, that once the contract is proved void or illegal there can be no recovery upon *quantum meruit* or for the reasonable value of the work done, even though the city, as a matter of fact, had been benefited by it.

This seems to be exceedingly harsh and unfair treatment to put upon an architect. It is inexplicable that any department of a municipality would be guilty of so gross a breach of what would ordinarily be regarded as common business ethics in taking advantage of the trust and confidence which an architect would naturally place in such a body. However, the courts have so held, and it behooves architects to take it into consideration in this class of work.

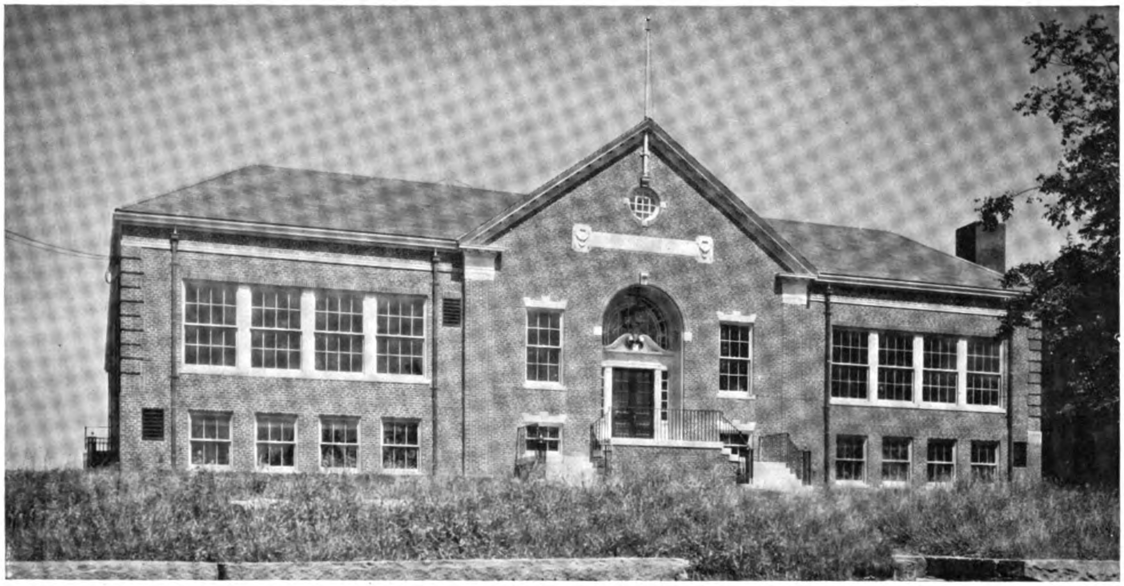
Counties, boroughs, towns and villages have a common practice of appointing committees who deal with architects when their services are required. Frequently these committees are not careful to ascertain and know the powers which they have been given. Thus they, as well as an architect, often innocently enter into a contract for plans and specifications which the committee has no power to make, and the architect has no right to compensation thereunder. For example, a county at one time appointed a committee to investigate and report regarding 'the best manner of raising funds,' and to submit 'recommendations relative to the matter of erecting a court house,' and decreed that the committee file its report in writing, 'together with plans and specifications, with the county clerk on or before ————.' The committee, after examining many different sets of preliminary plans and specifications, finally selected a certain firm of architects to do the work and entered into a duly written contract for seven sets of plans and specifications, detailed drawings, etc. When an action was later brought to recover for the preparation of plans and specifications according to the contract, it was held that the words 'plans and specifications' in the resolution meant *preliminary* plans and specifications, and that therefore the contract by the committee for working plans and specifications was beyond their power, and the architect suing upon such illegal and void contract could not recover. In this particular instance there was also an intimation that the architects could not recover for even preliminary plans and specifications, because it was understood and a custom for architects to draw preliminary plans and specifications without compensation in the hope of securing the contract for the complete work.

A requirement not mentioned in the contract is illustrated by the experience of one architect. By correspondence he offered, for a certain lunacy board, 'to examine the site and then to prepare all requisite probationary drawings for the approval of the committee, and all other drawings and details to be submitted to the commissioner of lunacy, and subsequently to draw the whole of the working drawings and specifications for $2,000.' The board accepted the offer through its clerk and the architect started his work. His first set of plans was disapproved; his second set was rejected as too costly and ornamental; his third set was disapproved, and then the board decided to engage another architect. By law, the plans had to be approved not only by the committee but by the court, and when the detailed drawings were completed they had to be approved by the commissioners and finally by the secretary of state. When the architect sued to recover for the reasonable value of the work which he had actually done, it was held that he could not recover, upon the ground that the architect knew the ordeal through which his plans must go before anything could be done upon them, and that he had agreed to receive the gross sum of $2,000 for the perfect and entire work. In this same case the court, dealing with the question as to whether or not the committee were fair judges of approval, wrote: 'If, with full knowledge of the powers and the circumstances under which he was to act the plaintiff (the architect) chose to agree with them that he should not be paid anything for his drawings unless they should be approved by them, I think he ought to be satisfied with their judgment.' "

Every school project presents new angles of relationship for the architect. A modest investment in legal advice will remove many of the dangers involved. The balance of the problem is to be solved only by the application of sound business judgment, reasonable diplomacy and that desire to render conscientious service which inspires every architect worthy of the name.

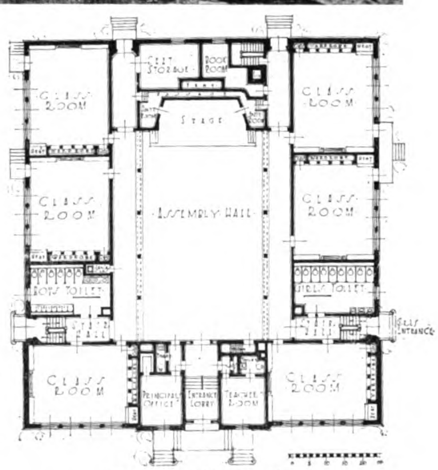
One-Story Elementary School, North Woburn, Mass.

McLAUGHLIN & BURR, ARCHITECTS

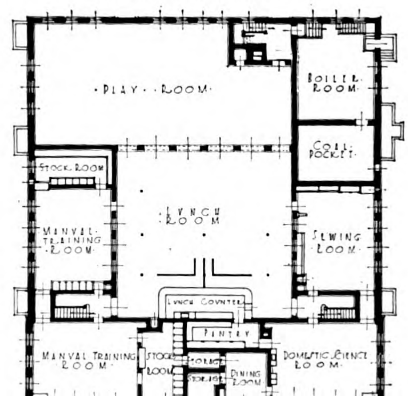


THE Rumford School was erected in 1922 at a cost per pupil of $361 or a cubic foot cost of 32 cents. Selected common brick and cast cement trim are used. Excepting at the front the building is covered by a flat roof containing sawtooth skylights. Fireproof construction is provided for the portion containing the boiler room.

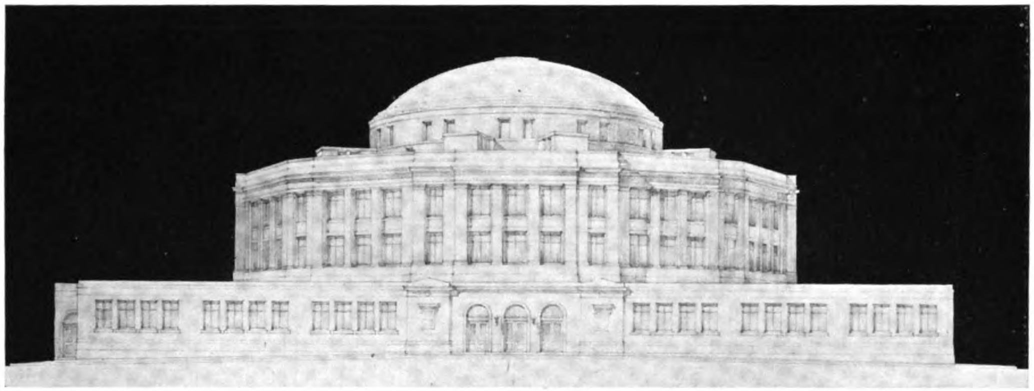
DETAIL OF PUPILS' ENTRANCE ON SIDE



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



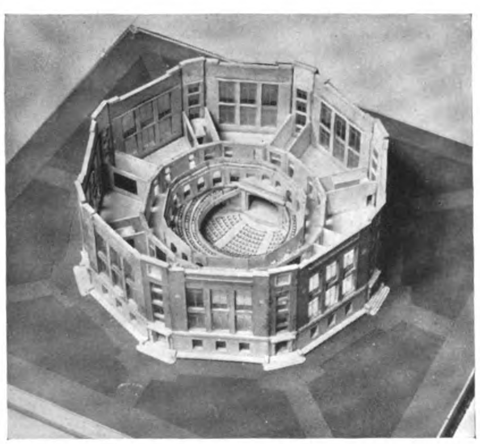
A New Development in School Planning

By JOHN IRWIN BRIGHT, A.I.A.
Architect, Philadelphia

FOR many months we have been studying the fundamentals of school plans. I must use the plural in common justice to the men in my office, who were so largely responsible for the result. We have come to the conclusion that the American school plan is stereotyped to its disadvantage. It has become standardized to rigidity. A large school is a multi-purpose building, and the largest division, the classroom, too often hampers the proper development of the other units. The attempt to evade difficulties by spreading the plan unduly only leads to wastefulness of operation and excessive cost. We have become convinced that the solution of the problem of a city school lies in a compact plan in which the classroom is structurally divorced from the relatively large units, and a polygon surrounded by a one-story plinth containing rectangular rooms is the scheme which seems to give the most promise. It has been tried out under varying conditions of size and terrain, with polygons ranging from hexagons to one 400 feet in diameter, polygons incomplete or in various combinations. The answer was always the same; in comparison with any rectangular plan there was an increase of elasticity and a decrease of cubage of some 25 per cent.

In the specific solution of the problem described here there are 67,240 square feet of instruction space enclosed in a cube of 2,200,000 cubic feet. In other words, there are needed but 32¾ cubic feet of building to develop 1 square foot of instruction space. The pupil capacity is 2,017, demanding 1,090 cubic feet per pupil. The standards of the National Education Association are chiefly concerned with the question of floor areas. It would be interesting to compare a building judged efficient by the N. E. A. standards with this school.

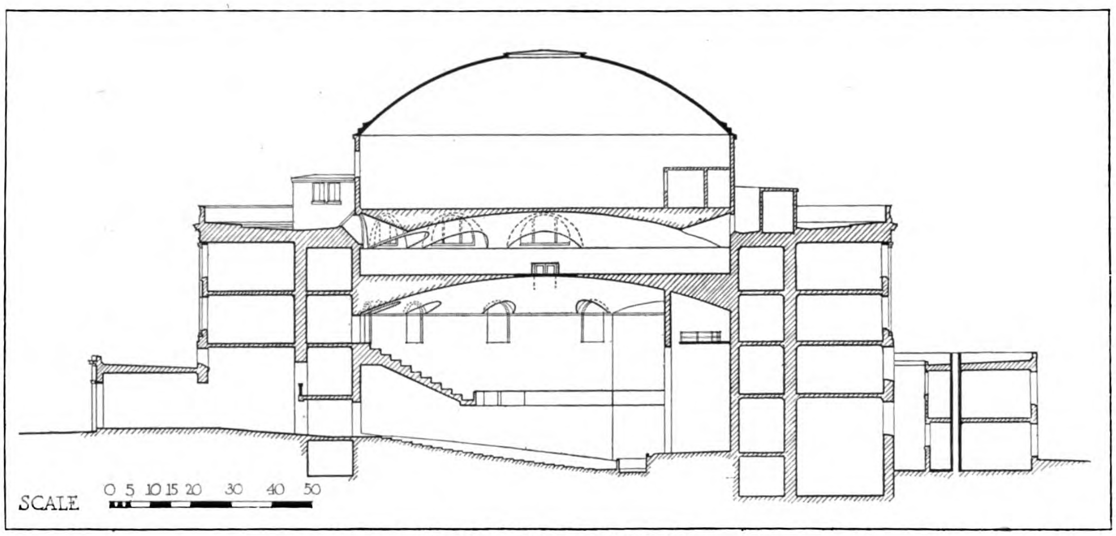
Viewed from the exterior, the appearance of the building has the effect of a circular form surrounded or buttressed by a low, square plinth. As the polygon is well within the lot lines, a nearby high building cannot seriously interfere with its light, and as the plinth has no superstructure and is only one story in height, it can be skylighted where desirable. The polygon, which occupies almost three-quarters of the area of the entire structure, with a maximum diameter of 174 feet, contains tiers of corridors, circular in form, only 330 feet in circumference; under the lowest tier run all the main pipes, conduits and heat ducts. Vertical risers serve the classrooms, the auditorium and gymnasium, and short branch lines distribute to the several rooms in the plinth. The economy of first cost and maintenance in this arrangement will appeal to any mechanical engineer for its simple efficiency.



View of Model, Showing Interior Arrangement

The Plinth

The building occupies a lot about 240 feet square, bounded by streets. The plinth, receding but little from the building line, contains the two main entrance lobbies, the laboratories, the manual training department, the library, the swimming pool and the domestic science rooms. There are also three minor entrances, and there being but two short corridors in the plinth the five entrances make possible the independent use of any unit. This is particularly



Section on North and South Axis

fortunate as the swimming pool, the machine shops and the library serve the community at large as well as the school children. In addition, the pupils of nearby schools will receive instruction in the various ground floor rooms. No criticism is of value unless the limitations of the lot area and the local instruction problems are kept clearly in mind.

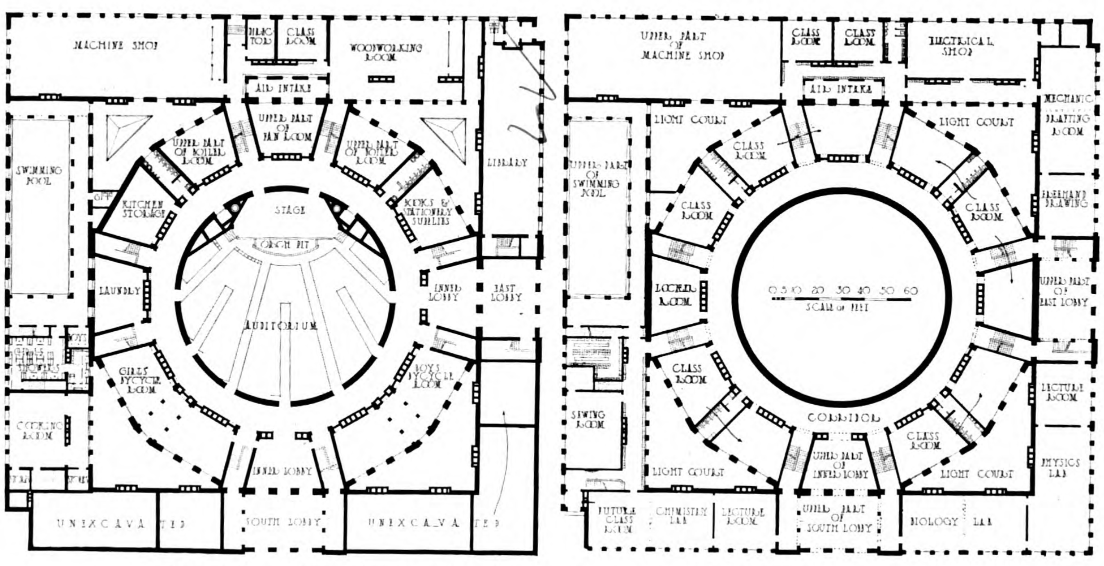
The Polygon

A. The Auditorium. This department is entered at grade through the two lobbies and, taking advantage of the recent progress in the technique of artificial lighting, it was deemed unnecessary to provide direct daylight for this room.

B. The Gallery. The circular plan of the auditorium makes possible a new form of gallery construction. Its principle is two concentric steel rings, connected by tension rods. There are no struts, columns or cantilevers, and the total weight of the metal is less than one-half of that found in the usual construction. The method allows the greatest freedom in the warping of surfaces for sight lines.

C. The Lunch Room. This room is placed over the auditorium and has adequate outside ventilation and light. It would have been quite possible to place this room on the ground floor, and the penetrations in the dome would then have served to daylight the auditorium. Attention is directed to the 90-foot structural tile dome in this room. Similar construction is used for the ceiling of the auditorium below and for the roof of the gymnasium above. (See section above.)

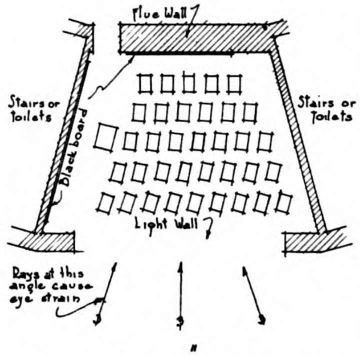
D. The Gymnasium. The lot being too small to provide for a playground, the area of the polygon (over half an acre) is used for this purpose. The gymnasium has light and air from every point of the



Ground Floor and First Classroom Floor Plans. Auditorium Seats 1,492, Including 576 in Balcony

compass, and the running track, eleven laps to the mile, is around the dome and in the open.

E. The Classrooms. The polygon, being in the center of the square, has its light assured, independently of any construction on nearby properties. With the exception of three small rooms in the plinth each of the classrooms is, in plan, a truncated pyramid. There are two outstanding advantages in this form: First, the light wall is considerably longer than that of a rectangular room of equal area, thus giving more light. Second, the desks can be so arranged that the angle formed by the line of vision and the front wall is essentially 90°, and yet glare is absolutely eliminated from the eyes of the pupils. This is a thing long sought for in school architecture. The way it is done is shown in the accompanying diagram. Daylight enters a classroom from many angles, and under the usual plan there are always enough rays falling on the pupils' faces to cause glare. Glare produces eye strain and is especially objectionable to the pupils near the window, but it can be entirely obviated by turning the desk slightly away from the light. We all do this when seated near a window or lamp, so why should it not be done for school children? The desks near the windows are therefore placed so that the light falls over the left shoulders and not in the eyes. The angle diminishes in each succeeding file until, in the depth of the room where the glare is negligible, the sides of the desks are parallel with the outside and inside walls. This arrangement allows every pupil a good view of the blackboard wall without awkward turning of the body or the head. The plan requires that all four walls of the classroom share in carrying the floor loads. They are of brick, making unnecessary any plaster or wood trim. Every classroom adjoins a staircase, and all but four on each floor are contiguous to toilet rooms.



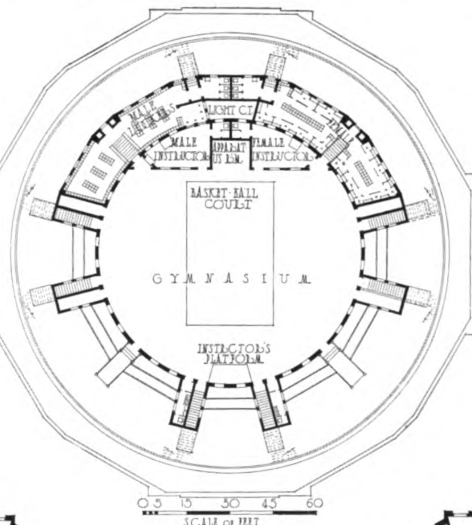
Plan Showing Seating of Classroom

The insistent cry of the public has been for economy of construction. We have answered by economy of plan. Without departing in any important particular from accepted construction standards, this school establishes a new low mark in relation of pupil capacity to building volume.

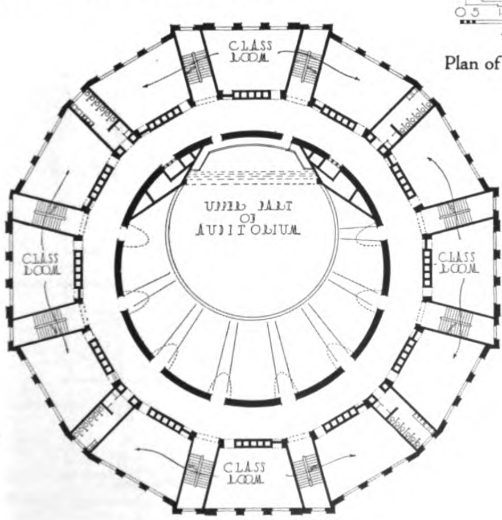
Editor's Note

This school plan marks a radical but logical departure in American architecture. Accepted structural practice is employed throughout but the planning problem has been approached from the viewpoint of developing a high degree of space utility disregarding precedents as to building perimeter.

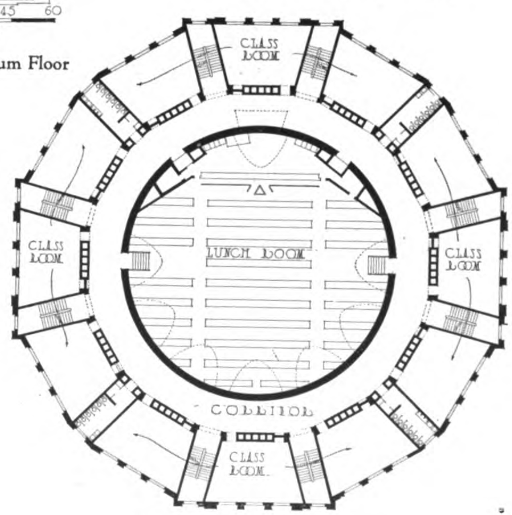
Here is a suggestion to architects of the possibility of freer interpretation of specific requirements.



Plan of Gymnasium Floor



Plan of Second Classroom Floor

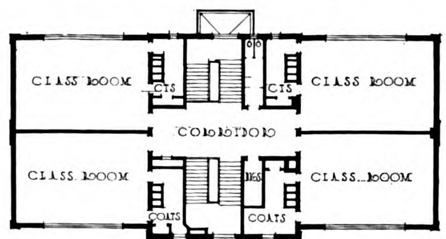


Plan of Third Classroom Floor

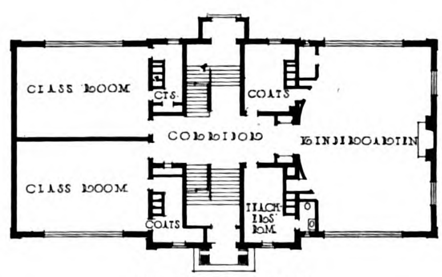
Riverside Elementary School, Rockville Centre, N. Y.

HUSE TEMPLETON BLANCHARD, ARCHITECT

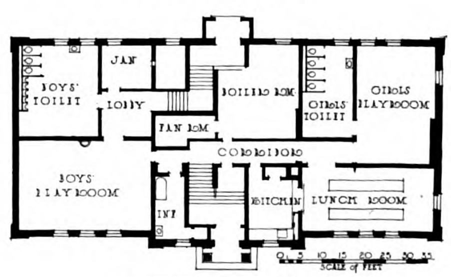
THE use of metal sash in this building, providing unusual window opening facilities, is an interesting feature. Completed late in 1921 at a cost of $100,000 or 45 cents a cubic foot. Capacity of 320 pupils. Exterior walls of purplish shale brick and cast cement trim. Semi-fireproof construction. Heated by split steam system.



SECOND FLOOR PLAN



FIRST FLOOR PLAN

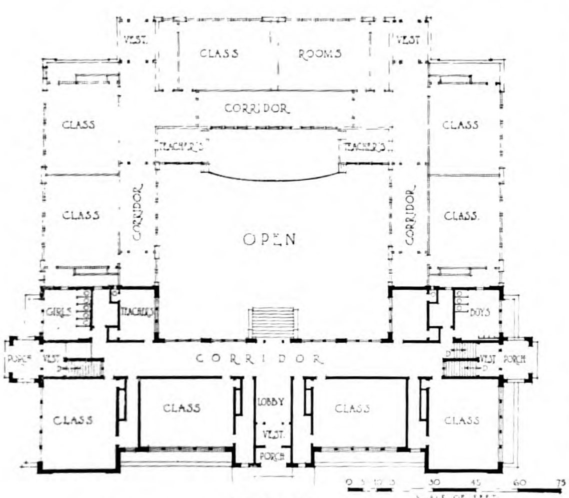


BASEMENT FLOOR PLAN

Rosemont School in Township of Radnor, Pa.

BOYD, ABEL & GUGERT, ARCHITECTS

FIRST section, as shown solid in plan, was built in 1914 *at a cost of* $39,000 (12.3 *cents per cubic foot*). *Rough texture brick exterior on granite base; roof of green slate shingles. This is an interesting example of flexible one-story school design. Future units can be added, using present teachers' rooms as sections of future corridors. Heating by split steam system. Center court can be left open or ultimately fitted as an auditorium.*



FLOOR PLAN SHOWING LATER ADDITIONS

VIEW OF CORRIDOR

A Heating and Ventilating System

By JAMES J. MAHAR
Schoolhouse Commissioner, and Heating and Ventilating Engineer, Boston

HEATING and ventilating for schools have many important features for consideration. To describe here all of the various systems adequately would greatly exceed our space, and rather than treat the subject generally we have thought it more helpful to describe in detail a definite application of a system for a junior high school. — The Editor.

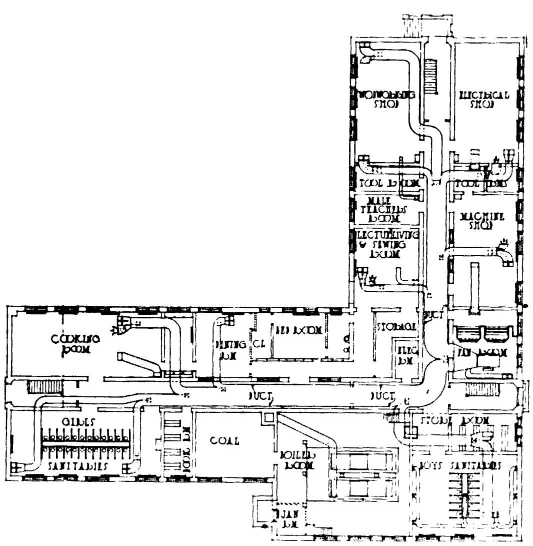
IN the designing of a modern junior high school building, nothing is more important than the early consideration of the type and proper design of its system of heating and ventilation. Too much thought and study can hardly be given to this very important part of the building, which means so much to the health and comfort of the pupils when the building is finally occupied.

The architect frequently proceeds too far with his plans before giving proper consideration to the design of the heating and ventilating system. This results in many cases in a design characterized by compromises to accommodate it to the building plans, with insufficient space for and improper location of the most important parts of the apparatus, and a system, when completed, inefficient in its results and difficult and costly in its operation. It is, therefore, the purpose of this article to point out to those having to do with the design and building of schools a few salient points based on experience, giving dimensions and areas when necessary, which it is hoped will be a guide in the selection and the proper designing of heating and ventilating apparatus for junior high school buildings in particular, and with necessary modifications for other types.

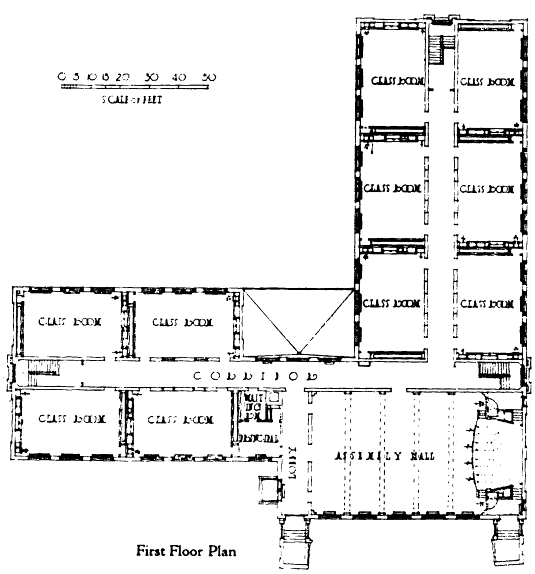
The space in the basement of the elementary school is required only for toilets, playrooms and frequently for manual training and cooking departments, thus leaving ample room for the location of heating and ventilating apparatus. The curriculum of the modern junior high school, however, makes greater demands upon basement space, leaving very little room for the location of the heating and ventilating apparatus. Machine, electrical and wood working shops, and sometimes the domestic science department, are located in the basement, in which event the rooms must be well lighted, comfortably heated and properly ventilated. It is therefore most essential in the consideration of the design of a junior high school building that as soon as the architect is appointed to submit sketches showing the requirements of the proposed building, the engineer be appointed also, to work with the architect in selecting the type of apparatus best fitted for the purpose, and to properly locate on the preliminary sketches the most important parts of the heating and ventilating system.

To illustrate adequately the problem and its solution, a concrete example is taken, viz., the junior high school located in the Roger Wolcott School District, Boston. This building contains 20 classrooms (high school size), an assembly hall and teachers' and master's offices, all located on the first and second floors. The basement contains three shops for machine, electrical and wood working courses, a domestic science unit, a cooking room and toilet rooms for boys and girls.

The type of heating and ventilating system selected for this building was a low pressure vacuum



Basement Floor Plan



First Floor Plan

Junior High School, Roger Wolcott District, Boston
Showing layout of ventilating ducts, outlets in rooms and direct radiators

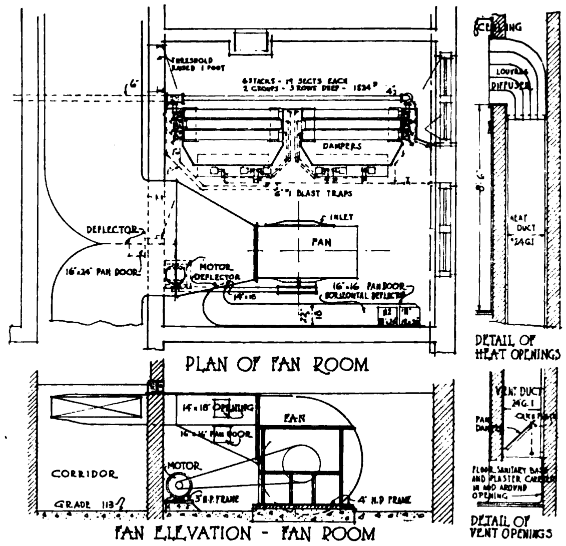
system of heating and a plenum system of ventilation. The reasons for this selection were that indirect stacks supplying air to the various classrooms could not be used without taking away valuable floor space from the basement classrooms, and that, furthermore, a vacuum system of heating permitted the location of radiators near the floor in the basement rooms, reduced the sizes of return piping, and allowed the returns to be installed on ceilings, where necessary to avoid entrance and exit doors. The type of system selected utilized only the minimum amount of basement floor area, as reference to the plans will indicate.

Ventilating System

Fan Room. The fan room is located in the basement, as near the center of the building as possible, and in a part not particularly well supplied with natural light, because, as already said, the well lighted parts of the basement are utilized exclusively for classroom purposes. The fan room is 23 feet wide, 22 feet long and 10 feet high. It contains 1824 square feet of radiators, set in two groups, three rows deep. In connection with these radiators is a multivane fan capable of delivering 35,000 cubic feet of air per minute, and operated by a 10-horsepower electric motor, belt-driven. A fresh air chamber 5 feet, 6 inches wide is provided in the rear of the radiators to allow the passage of fresh air supplied from the outside windows. A door opens from this chamber into the basement corridor, allowing for a recirculation of air in the building and, consequently, quicker heating when the apparatus is started before the morning school session. The primary radiators are encased in galvanized iron and are fitted with a series of mixing dampers which are opened and closed by a graduated action thermostat set in the main air duct, thus providing a constant temperature to the air leaving the fan room.

Air Ducts. Connecting the fan room with the various classrooms and the assembly hall is a system of overhead galvanized iron fresh air ducts, so designed as to furnish to each classroom 30 cubic feet of air per minute per pupil, and to the assembly hall 15 cubic feet per minute per occupant. By means of a galvanized iron deflector, placed in the main air duct, the assembly hall can be entirely shut off from the air delivery system, or operated separately when the remainder of the building is unoccupied. In designing the system of fresh air ducts and determining their respective sizes, a velocity of from 800 to 1,350 feet per minute was used in the horizontal ducts in the basement, a velocity of 7,500 feet per minute in all vertical ducts leading to classrooms and assembly hall, and a velocity of not over 300 feet per minute of the air entering classrooms and assembly hall.

Classroom Inlets. The fresh air inlets to classrooms are located on the walls behind the teachers, in close proximity to the outside walls. The inlets are of the design shown in detail, and are located



Detail Plan and Elevation of Fan Room
Showing arrangement of radiators and start of heating duct. At the right are sections through supply and vent openings in classrooms

8 feet, 6 inches from the floor. (See page 104.)

Classroom Vent Outlets. Vent outlets from the classrooms are located on the same walls as the inlets, but set at floors near the corridor walls. No grilles are used over these outlets, the floors and baseboards being carried around on the inside. This arrangement eliminates a dirt pocket, is easy to clean, and is not so unsightly as the grille or guard. The vent ducts from the classrooms are extended to the attic space and connected to large ventilators on the roof. By actual tests made in many school buildings, this location of heat inlet and vent outlet has been found to give better results in the distribution of the incoming air. The "Boston" or inside type of wardrobe is used in this building and is ventilated at the top through four circular openings connected to a galvanized iron duct which is extended to main ventilators on the roof. Aspirating coils are used to accelerate the movement of the air, insuring the removal of any odors from wet clothing, etc.

Toilet Ventilation. The basement toilet rooms are ventilated through the plumbing fixtures, closets and urinals. A separate system is installed connecting the vents from the various fixtures behind the slate back partitions with a main duct, which is exhausted by a multivane fan, through special ducts to the roof. This method of ventilating toilet rooms through the plumbing fixtures has been found by experience to be a most efficient method and to provide a constant circulation of fresh air in the toilet room.

For the convenience of the architect in providing for the necessary ventilation, a summary of this may be of value, the sizes, of course, varying with the size of the building and the number of pupils to be provided for in each classroom.

Area cold air inlet to fan room =

$$\frac{\text{total air supply cu. ft. per min.}}{1100} = \text{Area in square feet of fresh air inlet.}$$

Size of main horizontal air duct in basement =

$$\frac{\text{total air supply cu. ft. per min.}}{800 \text{ to } 1350} = \text{Cross section area in square feet of duct.}$$

Size of heat duct to classroom

$$\frac{\text{No. of pupils} \times 30}{500} = \text{Area vertical flue in square feet to each classroom.}$$

In the junior high school under consideration these sizes of ducts were used:

Area of fresh air window	= 32 sq. ft.
Area of main duct in basement	= 24 sq. ft.

Dimensions of each classroom heat duct = 18" x 20".
Dimensions of each classroom vent duct = 18" x 32".
Dimensions of heat inlet to classroom = 20" x 32".
Dimensions of vent outlet to classroom = 18" x 32".

Vacuum Heating System

The heating system of this school consists essentially of two horizontal return tubular boilers, a duplex unit of vacuum pumps, radiation and the usual equipment of valves and vacuum traps. The boilers are standard horizontal return tubular boilers in twin setting, 60 inches in diameter and containing 72 3-inch tubes 18 feet long, with fireboxes equipped for oil burning. Each boiler is designed to handle two-thirds of the load, but if occasion required, one boiler could carry the full load for such time as required to make repairs.

The vacuum pumps are the combined rotary vacuum and low pressure boiler feed pumps, set as a duplex unit. Each pump is capable of handling 16,000 equivalent feet of direct radiation, and excepting in very severe weather, or on turning steam into a cold system on starting, one pump will care for the load, thus leaving one in reserve or for cleaning or repairing. The pumps are furnished with automatic control, which is actuated by both a float switch, which controls the water line in the return tank, and a diaphragm vacuum switch which controls the vacuum carried. The motors can be run together or independently. The motors for the pumps, which are each of 1½ horsepower, are set on the same base as the pumps, and are connected to them through flexible couplings.

Piping

The piping is so arranged that the main building lines are entirely separate from the primary radiation, which is in use only part of the time, and the assembly hall line which is only used occasionally. The supply piping in general is carried at the ceiling and close to the outside walls, making short runouts to risers, thus saving the traps and valves necessary to drip them, and avoiding the necessity of cluttering up the walls with piping. At intervals drip connections are taken from the main, thus insuring dry piping. Each supply and return riser is valved to allow for repairs being made without making necessary the shutting down of the rest of the system, a very important feature, of course, in a school building, where repairs are often required.

The radiation used throughout is the water type fitted for a vacuum system. Wall radiation is used in classrooms, stair landings and basement rooms, and column radiation in master's and teachers' offices, corridors and assembly hall. Each classroom is equipped with sufficient radiation to cover the heat losses through the exposed wall and glass, the air being taken care of in the ventilating system, plus 20 per cent which is allowed for quick heating. This method is very satisfactory, as an automatic thermostatic control is used in conjunction with it, which keeps the temperature of the room at 70°.

Vacuum Traps. These are of the non-adjustable type, with thermostatic discs and screw tops, and can be operated up to a pressure of 10 pounds. The blast traps for the dust radiation are of the same type, but with flanged tops.

Automatic Control. The automatic control system, which is used to control the temperature of all classrooms, workrooms and assembly hall, as well as to control the opening and closing of the main vent dampers in the vent hoods on the roof from a switchboard in the boiler room, is of the standard thermostatic two-pipe compressed air type.

The system consists essentially of two hydraulic air compressors, each of sufficient capacity to handle the air needed, a galvanized iron air storage tank fitted with a relief valve set at 15 pounds, diaphragm valves set on the supply ends of the radiators, on the mixing dampers in the fan room and on the vent dampers on the roof, positive action thermostats located in classrooms, etc., with a graduated action thermostat in main air duct to control the mixing dampers.

The air piping, which is galvanized, is run concealed in all rooms above the basement, and the bases of all risers are fitted with drip pockets with air cocks to remove any condensation which might gather there. A slate panel is located in the boiler room, on which are mounted the pressure gauge and the three-way cocks which operate the vent dampers on the roof.

Oil-Burning Apparatus

A complete system of oil-burning apparatus is installed in the boilers of this building. Oil was selected as a fuel because of its many advantages as compared with coal, which may be summed up briefly:

1. The saving in storage space, oil requiring only about one-half the space that is required for coal.

2. The saving in labor in handling coal and for expensive ash removal.

3. The cleanliness in and about the building, eliminating dust and dirt, thus reducing the annually recurring expense of painting and tinting.

4. The saving in fuel consumption. Economy in the use of fuel oil will undoubtedly be obtained in the heating of this building, because of the nature of the load. In the spring and fall, particularly, it has been found from actual experience in other

buildings that it is only necessary to operate the fires for perhaps an hour or two in the morning and again for a short period in the afternoon. The burning of oil, therefore, in this plant will do away with the costly banking losses in other school buildings.

5. The thermal efficiency of oil is greater than that of coal. From the results of tests made in various plants it has been found possible to equal the results of one ton of good quality coal with 150 gallons of fuel oil, having a calorific value of 18,400 B.t.u. per pound. Taking a season's run this would be arrived at thus:

EVAPORATION (from and at 212°)

Coal (14,000 B.t.u.) 8.5 lbs. water per lb. of coal. (Good average practice.)

Oil (18,400 B.t.u.) 14.2 lbs. water per lb. of oil. (Average results of tests made under operating conditions.)

EFFICIENCY

$$\text{Coal } \frac{8.5 \times 970.4 \times 100}{14,000} = 59\%$$

$$\text{Oil } \frac{14.2 \times 970.4 \times 100}{18,400} = 75\%$$

COAL EQUIVALENT per short ton (2,000 lbs.) (Oil 8 lbs. per gal.)

$$\frac{14,000 \times 59 \times 2,000}{18,400 \times 75 \times 8} = 150 \text{ gallons}$$

6. Saving in the cost of fuel. With oil at 4 c. per gallon, it will thus be seen that $6 worth of oil will equal the results of one ton of coal, and in the case of this school, where approximately 300 tons of coal per year would be burned, there will be a saving of $750, even allowing for coal as low as $8.50 per ton.

Description of Apparatus

The oil-burning equipment designed and installed in this building consists of turbine burners to which the oil and air are supplied by means of motor-driven blower and pump sets, which are in duplicate. For each set the motor is directly connected to the blower, but between the blower and motor is a worm reduction gear driving a rotary geared pump which furnishes oil at the desired pressure to the burners, the whole being mounted on a cast iron bed plate. A certain amount of oil is by-passed back to the oil storage tank, depending upon any given fuel requirement of the boiler.

A rectangular steel fuel oil storage tank, 20 feet by 11 feet, 3 inches by 6 feet deep, of 10,000-gallon capacity, is provided with a fill line constructed of 8-inch steel pipe and running from the tank to the sidewalk. A 2-inch galvanized vent pipe is carried from the tank up 12 feet above grade with a screened return bend. Oil is drawn from the tank through a 2-inch suction line, the oil being heated on the way to the pump by means of a 4-inch manifold heater surrounding the suction line and approximately 15 feet long. From the delivery side of the pump the oil goes through a discharge line, and close to the boiler another heater is installed which raises the temperature of the oil at the burners to approximately 170° Fahr. For atomizing the oil and revolving the turbine cup and wheel at the nozzle of the burner proper, a 3-inch air line is run from the blowers to the burners.

Automatic regulation, controlling the supply of oil to the burners is provided, being actuated by the boiler pressure. In the furnaces themselves, the floors, sides and front walls, as well as the fronts of the bridge walls, are lined with the best grade of fire brick. In order to protect the waterproofing under the boiler room floor, this construction is used:

2-inch sand fill.
2 courses of terra cotta.
1 layer of red brick.
Finally, the finished course of fire brick forming the firing floor.

Two burners are installed in each boiler, the center line being about 10 inches above the firing floor.

Air-Washers and Humidifying Apparatus

This building being located in a suburb of Boston on a lot free from city dust, etc., installation of an air-washing apparatus was eliminated. It is the firm belief of the writer, however, that it is better to install such apparatus in school buildings located in the city, where dust from the street, smoke and local impurities in the air are in such an abundance that they may become harmful when introduced in the buildings. Air-washing and humidifying may be accomplished by the same apparatus. The object of humidifying the air is to regulate and control the relative moisture content of the air, while air-washing deals only with the cleansing of the air from dust and other impurities.

There are two general types of air-washers: one is a dry air-washer or filter, the other a wet air-washer or spray. The dry air-washer generally consists of cloth screens of a material which will allow the air entering the building to pass through the screen on its way to the fan. These screens very soon become soiled or torn, and unless renewed or cleaned they offer great resistance to the heating and ventilating system. In addition they remove only the larger particles of dust and allow the finer particles to pass through.

The wet air-washer, as generally used today, does away with the objections just mentioned, and instead uses water entirely to clean the air. The air-washer consists of three parts,—the spray chamber, the eliminating plates and the tank for catching the spray; besides these a reciprocating pump for supplying water and the screen or filter for removing dirt from the water used in the spray chamber are necessary. The washers designed on this type are considered most economical in operation, because the water supply can be used over and over again, only renewed at weekly periods.

Laboratory Installation. Junior high schools today are requiring much of the laboratory equipment generally found in regular high schools, such as chemical and physical laboratories. The method of

ventilating which is used in the Boston schools is substantially thus described:

The main room, in which the ordinary experiments are made, is ventilated in the same manner as the classrooms, and as already described; that is, that the air is supplied from a central fan system and the outgoing air is carried to the roof in a separate duct. The ventilation of the fan hoods, where strong chemical fumes are present, should receive special treatment in ventilation. This can be accomplished by exhaust fans with direct connected motors, which are capable of exhausting approximately 600 cubic feet of air per minute, and so arranged that two hoods can be vented by one fan. Two vent openings are installed in each hood, one located at the top and the other at the bottom, with cast iron register faces over the openings. The vent piping from the bottom is carried up in back of the hood and is connected with the upper opening on the top of the hood; the piping from the two hoods is then connected and run to the exhaust fan set on a platform directly above, which exhausts the gases to the roof. All vent piping should be made of an acid-proof material, of which there are several on the market. Glazed terra cotta pipe may be used as a main vertical riser, and the connections to the various hoods can be made of a special process metal which will withstand the attacks of chemical fumes.

Locker Room Ventilation. Where locker rooms are provided in the basement proper, ventilation is most necessary, especially if the locker rooms are to be used in conjunction with a gymnasium.

A very satisfactory method which has been used in the Boston schools is briefly described: The lockers are provided with louver vent openings near the bottom of the doors and also with circular openings in the backs of the lockers near the top. A central space 6 inches in width is provided between the groups of lockers set back to back, and a 4-inch space is provided between the backs of the lockers and the wall, where lockers are set against the wall in single tiers. From this space are taken galvanized iron ducts, connected into a central gathering chamber containing an exhaust fan which discharges the air through a special duct to the roof. This system of ventilation causes the fresh air to enter at the bottom of the lockers, to pass through the clothing, then through the vent ducts to the gathering chamber, and then to the roof. This insures a positive circulation of air from the locker room through the lockers.

Comparative Cost of Heating and Ventilating

In conclusion, it may be of interest to give here a few figures showing the comparative cost of the heating and ventilating system installed in this building:

General contract	$329,383
Heating "	28,934
Electrical "	19,696
Plumbing "	13,243
Total contract price	$391,256

It will be seen that the cost of the heating and ventilating system was only 7.3 per cent of the total contract price, which is a very low percentage.

An analysis of the cost of heating gives:

Wall radiation	4,317 sq. ft.
Column "	994 " "
Indirect "	1,824 " "
Total	7,135 " "

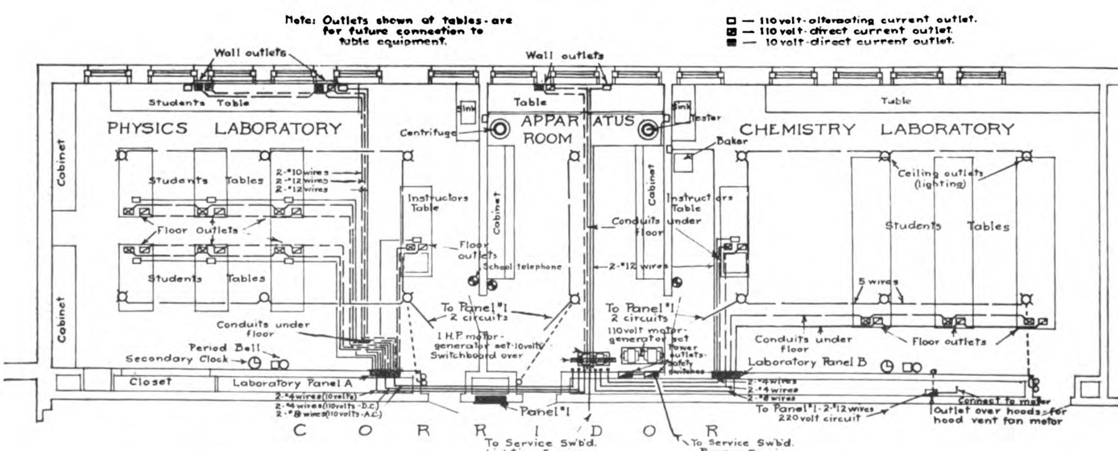
Cost per square foot of radiation, $4.05.

Reducing indirect radiation in terms of direct, we have:

Wall radiation		4,317 sq. ft.
Column "		994 " "
Indirect "	6 × 1,824	10,944 " "
Total		16,255 " "

Or, cost per square foot equivalent to direct radiation, $1.78.

The cubic contents of this building are 655,933 cubic feet, and the cost of the heating and ventilating system installed in the building, based on this cubage, would be 4.41c. per cubic foot.



Details of Electric Wiring and Outlets in Physics and Chemistry Laboratories, with Common Apparatus Room

(*See article on opposite page*)

Electrical Wiring Layouts for Schools

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE wiring layout of the modern school building is more or less complex, depending upon the type of building under consideration and the school courses that are to be given. In schools of the primary type the problem becomes one of lighting only, with at best minor power equipment and the ventilation of the toilet sections, the usual fire alarm equipment and two or three telephones. Clocks are as a rule not used in primary school buildings, other than one or two clocks located in the office and corridor.

In grammar schools the problem again becomes one of lighting, with power-driven fans for the ventilation of the toilet sections, and in the larger grammar schools for the classrooms and for the gymnasiums and assembly halls. Separate fresh air and vent fans may be used for the different sections or the duct system may be so arranged that one fan equipment may be used (by the use of proper deflecting dampers) either for the classrooms or for the assembly hall and gymnasium at will. Provision should be made for the installation of fire alarm and signal equipment in all school buildings, regardless of type, and also for local telephones between the principals' offices and the classrooms of the larger grammar schools. An electric clock system may also be added, but it need not be as complete as the systems that are required throughout high school buildings where more advanced courses are given.

Primary and Grammar Schools. These buildings are not as a rule intended for general use at night; nevertheless the lighting equipment should be complete, as it is becoming the custom to make use of the school buildings as community centers, for night courses and for entertainments, particularly such parts as gymnasium and assembly hall sections, and therefore the lighting of the classrooms, the control of circuits and the types of lighting fixtures, etc., throughout should be proportioned as if the building were to be used for night work.

The general methods of wiring throughout the building, the number of lighting units used for the classrooms, the methods of running distributing feeders and service lines, as well as the methods of installation of low tension equipment will be generally the same for any type of school building, differing only in the volume and completeness of the work. School buildings may be of first, second or even of third class construction. If of first class construction, it is obvious that the wires of all circuits must be run in conduits. If of second class construction, it is advisable that all wires of the lighting and power circuits be run in conduits or with B. X. armored wires, even though local rules permit the installation of other methods of wiring. If, however, it becomes necessary to keep the cost of construction down, it may be permissible to install the wires of the clock, bell, telephone and fire alarm systems in the construction without the use of conduit or covering; if this is done the wires are taped together and clipped to the timbers and studding, a porcelain tube being used at each point where the wires pass through the plaster to connect to an instrument. With wires installed in this way, however, standard rubber-covered wires should be used and care should be taken to keep all wires away from steam and water pipes.

High Schools. The wiring layout for the modern high school building will include:

(1) Service mains, with transformer equipment.

(2) Riser and feeder distribution, with switch and panelboards.

(3) Lighting circuits throughout classrooms, corridors and offices.

(4) Lighting circuits through assembly hall, gymnasium, lunch rooms, etc.

(5) Lighting circuits throughout shops, industrial sections and laboratories.

(6) Power circuits for ventilating fans, elevator, vacuum sweeping equipment, etc.

(7) Power circuits to motor-driven boiler room equipment.

(8) Power circuits throughout shops and industrial sections, laboratories, etc.

(9) Provision for electrical cooking throughout domestic science laboratories.

(10) Empty conduit raceways for wires of outside telephone service.

(11) Local telephone equipment throughout building.

(12) Electric clock and program bell system.

(13) Local fire alarm system.

(14) Provision for city fire alarm connection.

(15) Door bells, where required.

(16) Provision for radio equipment, with amplifier in assembly hall.

(17) Lighting fixtures.

(18) Special wiring circuits to machine room equipment, throughout industrial sections and mechanical laboratories.

(19) Special wiring throughout chemistry and physical laboratories, with equipment for tables as required.

(20) Special wiring throughout lecture rooms, if necessary.

Preliminary Information. Certain information must be at hand before the wiring layout can be completed; this includes some knowledge as to the extent of the courses to be given, so that the wiring of the classrooms, laboratories, manual training rooms, etc., may be made adequate to operate the equipment that will be used. Information must also be had as to the characteristics of the service to be

supplied the building, both for electric power, lighting, telephone and fire alarm service. It is obvious that if the building is large enough to warrant the installation of engines and generators, the characteristics of the electrical service will be determined by the generators installed. With the service taken from the street mains, however, we must have accurate information regarding service supplied by the service company.

If the building is to be located in a section furnishing direct current, the service will be delivered over a three-wire, 110–220 volt system for lighting, and at either 110 or 220 volts for power. If the street mains are underground, they will continue from the nearest manhole pit underground to the building; if the street mains are on poles, the service lines may swing from the nearest pole to cross arms on the building, thence through conduits to the service switchboard, or else a pole may be set on the street at a convenient point and the service lines taken from this pole, underground, to the building. If alternating current service is to be furnished, the service company will as a rule provide separate transformers to supply the building; these transformers may be located on poles on the street or they may be installed in a special transformer vault within the building. It is always advisable, where possible, to provide a vault and have the transformers in the building, as transformers located on the street are at best unsightly, and in the event of transformer fuses opening during winter storms, they are more quickly and easily replaced with the transformers in the building; this also applies if the transformers are located in underground pits in the street, as in the event of heavy ice storms it is difficult to remove the covers and enter the pits for the replacement of fuses, particularly if these fuses should open at night, during hours of night school, or during the use of the assembly hall or gymnasium.

It is imperative that information be had from the service company as to the voltage phase and frequency of the service it will supply, as this information determines the types of motors to be used, the type of panelboards and switchboards, as well as the weight of copper that will have to be provided for the main and sub-feeders. As a rule, alternating current lighting service will be furnished over a two-wire system at 110 volts, or over a three-wire system at 110–220 volts, while power will be furnished over single-phase lines at 110 or 220 volts, or over three-phase lines at 110–220, 440–550 volts. Again from some of the older plants power may be furnished at 440 volts on either the single-, two- or three-phase systems. The two-phase service, for motors at any voltage, and 440 volts for power service will be met with rarely, as the standard power service will be three-phase, at a pressure of either 220 volts or 550 volts.

It is well to note also that while the power service in general used through a town may be delivered over a three-phase system, we must make sure that the power service available at the site of the building is to be delivered at three-phase, as three-phase motors should be provided for the equipment, or provision must be made by the service company to extend the three-phase lines to the site. It is advisable where possible to insist on a three-phase power, as the use of large single-phase motors on lighting circuits is not satisfactory, due to the high current taken by these motors which causes poor regulation of the voltage at the lamps.

It may be said that before it is determined to use single-phase motors of any size in a building it is well to ascertain the maximum horsepower in single-phase motors that the service company will permit on their lines, as many companies will not permit single-phase motors of more than two or three horsepower to operate from the lighting circuits. Again, where three-phase circuits cannot be provided, much larger motors may be used with special permission from the company. Where, however, the general power service is 550 volts, three-phase current, it is always advisable to use single-phase motors for kitchen equipment and for tools requiring fractional horsepower, these motors to be connected to the lighting circuits.

Ascertain from the telephone company the point at which their service will be available at the building and their requirements as to the sizes of conduit from their lines to the basement of the building; as a rule a 2-inch conduit is required, although in certain instances larger conduits are insisted on. This conduit will terminate in a service cabinet at the point of entrance, sub-conduits running from the cabinet to the telephone outlets, terminal strips being installed in the cabinet and all branch connections made therein. In the event of gas piping for emergency lighting being carried as a sub-contract to the electrical contract, ascertain the point where the gas service will enter the building and the gas company's requirements as to metering and control. In case of the city fire alarm's being connected with the building, ascertain the city's requirements as to the fire alarm service and the point at which the wires will enter the building. In the event of the lighting, power and telephone services' being carried into the building and terminating in the same general service room, it is important that the underground service lines of the telephone and fire alarm systems be kept not less than 3 feet from the wires of the lighting and power services.

Wiring Details for Classrooms. The lighting of classrooms for best results will require from four to six ceiling outlets for use with direct lighting fixtures. A standard classroom approximating 22 by 28 in floor dimensions will require a single-circuit and from 600 to 800 watts; many types of lighting units are offered for this service, both in the direct, semi-indirect and full indirect type, with fixtures of the pendant type, and with ceiling collars closely spaced to give distribution. Authorities differ as to the volume of illumination required for best results,

as well as the spacing of the lighting outlets. The writer's experience, however, has been that four units, practically spaced on the quarters of the room with the use of either 150- or 200-watt, Type C lamps, will give adequate illumination and all necessary diffusion for average classroom work. In addition to ceiling units there should be either a floor outlet for use with a portable lamp or a pendant fixture over the teacher's desk. As a rule there should be two switches installed, each switch controlling one-half the illumination of the room; the teacher's lamp may be switched separately or may be controlled independently of the ceiling outlets from the socket at the fixture. While possibly slightly better diffusion may be had with a greater number of outlets closely spaced, the matter of proportion and the appearance of the fixtures in a room are of equal importance with the volume and diffusion of the light, and the use of simple pendant fixtures with the proper type of enclosed unit is less expensive to install and maintain than a large number of units that are close to the ceiling, and they are, in the writer's opinion, much more pleasing to the eye. In study rooms and in classrooms where bookkeeping, typewriting and sewing are taught, six units are preferable to the use of four, in which case the four units would be fed from a separate circuit which may also be utilized to feed the two additional outlets in an adjoining room.

While certain authorities advocate as high as an average of 8 candle-feet for the lighting of classrooms, the writer's experience has been that an average of 4 candle-feet is ample if proper lighting units are used, since beyond a certain point too much light is harmful, and in many cases when relamping fixtures in classrooms the larger lamps have been removed and units of 150-watt or even 100-watt lamps installed, with satisfactory results.

The hanging height of the unit above the floor will depend upon the type of unit or reflector used; as a rule, however, the filament should be approximately 10 feet above the floor, with the lamp properly focused in the reflector. All things considered, a plain bowl type of enclosed unit of the proper glass will give satisfactory results, as these units are not expensive, are pleasing to the eye and are easily kept clean, whereas units of the indirect or semi-indirect type require greater care in cleaning and are more likely to be broken than units of the bowl.

In addition to the lighting service each classroom should be furnished with a clock, local telephone and period bell. In classrooms where bookkeeping or domestic science work is taught and where the instructors are required to keep in touch with outside sources, an outside telephone may be also required, this either connected on a special trunk line or through the switchboard in the general office. The clock and the period bell may be located side by side at a point just above the blackboard moulding, the wires of both clock and bell terminating at the same outlet; the clock and bell should be mounted if possible on an inside wall, and at a point where the clock may be seen both by the teacher and the pupils. It is generally preferred that the clock and bell be located above the entering door from the corridor and at a point near the teacher's desk. The local telephone should be of the wall type and may be mounted either on the blackboard at the rear of the teacher's desk or at a point near the door. Floor outlets, where used, should be located near the teacher's desk so that a cord may be readily led from the outlet for the use of a portable desk lamp; the floor boxes should be waterproof and should be fitted with a cord guard for the protection of the lamp cord. If it is preferred to make use of a ceiling fixture at the desk in place of a floor outlet, the fixture used should be of a type permitting the lamp to be on a level with the eye.

Laboratories. The lighting of the laboratories will be essentially the same as the lighting provided for the classrooms, excepting that a greater illumination may be required; clock, bell and telephone will be the same as required for the classrooms.

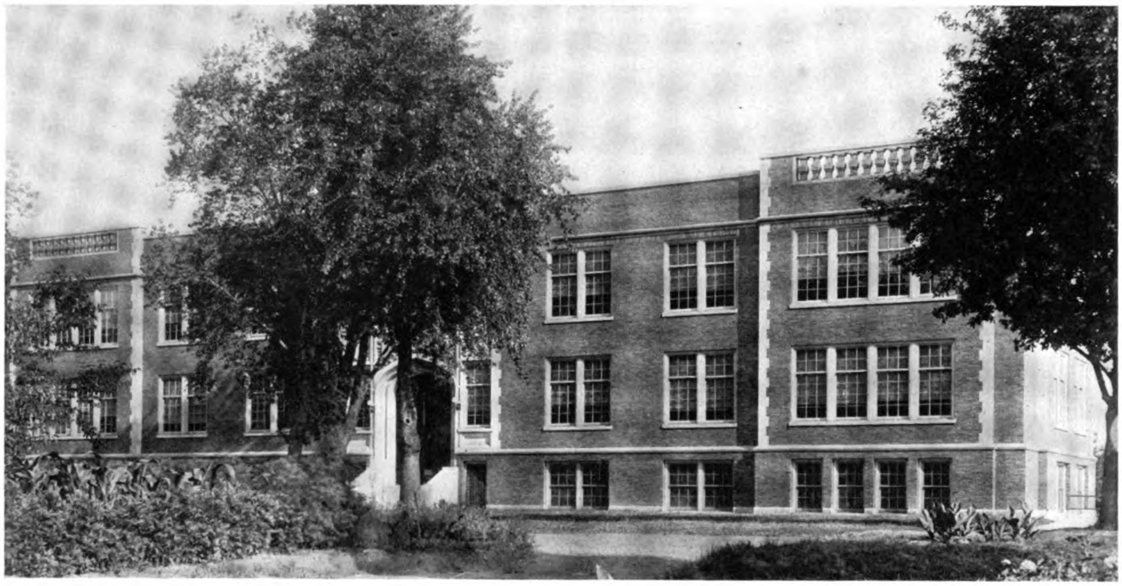
Where sewing is taught there should be a number of receptacles provided, preferably of the wall type (spaced possibly 4 feet apart) so that sewing machines may be operated from these receptacles. As sewing machine motors require but little power, from six to ten outlets may be operated from a single circuit, the circuit feeding from the nearest panelboard. From one to three outlets should be provided in the sewing rooms for use with electric irons, these spaced conveniently for the installation of ironing tables or stands; where iron outlets are used, each should be operated on a single circuit from the nearest panelboard, and each outlet should be made up of one of the standard heater combinations consisting of a flush switch, receptacle and pilot lamp, all mounted on one flush plate. The outlets should be installed approximately 48 inches above the floor.

In domestic science or cooking rooms the lighting and low tension equipment will be the same as required for the classrooms. While these laboratories will be equipped with the usual gas equipment for cooking, both at the instructors' and students' tables, it is also advisable that provision be made to provide for instruction in cooking by electricity. In certain schools all cooking laboratories are equipped for both gas and electric cooking; where this is not desired it is essential that at least one room be fitted for electric cooking, or with both electricity and gas. Electric cooking will (depending upon the size of the stoves that are to be used) require a high current load, and as a result the copper supplying the service to the rooms must be large, so that the feeder circuit should be carried back to and fed from the service switchboard.

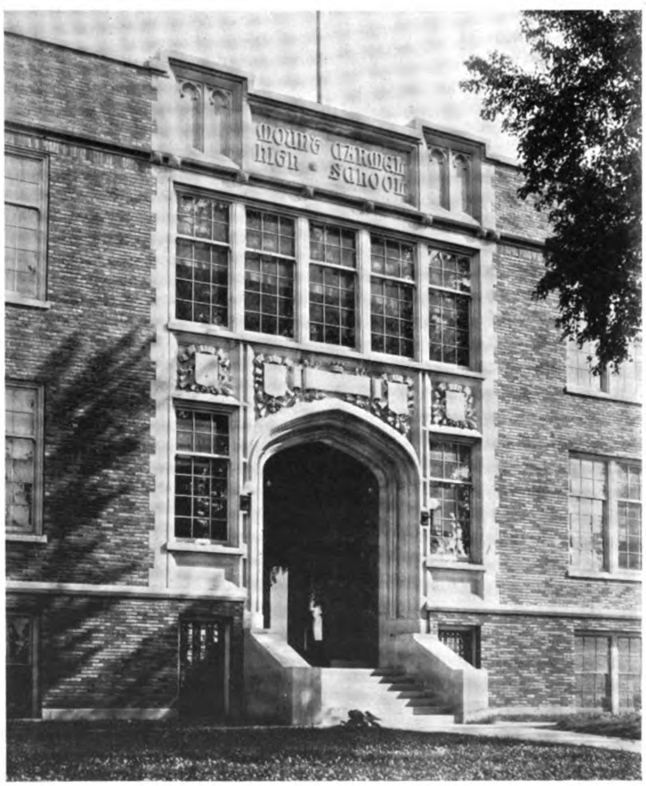
In electric cooking we have the large electric ovens, ranges and other equipment for use in hotels and restaurants, the smaller household ranges for family use, and the isolated hot plates, toasters, waffle irons, percolators, grills, etc., which are in

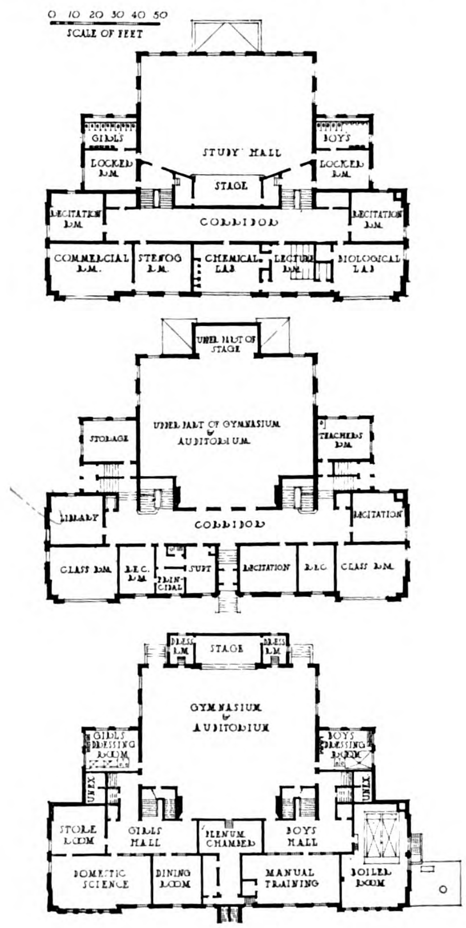
High School at Mount Carmel, Illinois

HEWITT & EMERSON, ARCHITECTS



BUILT in 1916 of brick and frame construction at a cost of 15 cents per cubic foot. The principal feature of the plan is the placing of the study hall floor at halfway level between first and second floors, providing a story and a half height for the combined gymnasium and auditorium.





general use on the family dining table or buffet; in an average laboratory the equipment will consist of possibly one large range, one or more household ranges, and a number of the smaller units of different types. Depending upon the table layout, the equipment may consist of one household range to each of the students' tables, thus providing for from four to six pupils, with a larger range at the instructor's table, or with a single large range at the instructor's table, and individual grills or hot plates at the students' tables. The usual practice tends to the use of individual plates or grills, with one large range and oven to the laboratory, the plates being combined with the use of gas stoves at the students' tables. This method is inexpensive to install and has proved satisfactory in practice, as all types of portable equipment may be used by the students and the manner of cooking on the larger ranges is taught from the range at the instructor's table.

It is advisable to provide a special panelboard in the laboratory for the control of the cooking circuits, this located at some point convenient to the instructor's table. The cabinet should be fitted with a lock so that the equipment cannot be operated or tampered with when the laboratory is not in use. The household ranges are wired for use on three-wire circuits and will require from 7,000 to 10,000 watts with all utensils in use; the feeder copper therefore to the range should be either three No. 8 or preferably three No. 6 wires. All fuses for the individual circuits of the range are contained in a panel in the body of the range, the feeder wires terminating in the lugs provided on this panelboard. All controlling switches for the operation of the individual heating units are mounted on the front of the range. The conduit from the master panelboard should run in the floor construction to the range, turning up and connecting with the range cutouts.

The individual plates or grills for the students' tables are wired for use on a two-wire circuit at 110 volts and will require from 300 to 1,000 watts each, depending on the size of the unit; not more than two of these units should be operated from a single circuit from the panelboard, and where the larger are to be used there should be a single circuit carried to each unit. It is good practice to provide two 1-ampere double receptacle outlets on each table (where four pupils are to work) and to carry two circuits, one from each double receptacle back to the panelboard, the two circuits to be installed in one conduit in the floor construction from the panelboard to the table. A heater combination can be used with a pilot lamp at each outlet or, with master control at the panelboard, this may be omitted.

Where, however, a large number of students are to work, and tables and high capacity equipment are contemplated, it is advisable to locate a cutout board in a cabinet in each of the tables and to run separate circuits, each separately fused, from the cutout board to each table outlet, each outlet to consist of a single 10-ampere receptacle. The several cutout panels are then grouped and connected to a single feeder, and this is mastered from a switch under lock at the location of the instructor. With a large number of units this method is less expensive than the installation of single circuits from the instructor's panelboard to each receptacle on the tables. The use of receptacles on the tables is to be preferred to the use of fixed units, as with this method any type of portable equipment may be operated from any receptacle, and the equipment may be removed and stored when not in use. Nothing smaller than No. 14 wire should be used for cooking work, and when the distances from the cutout to the units are greater than 80 feet, No. 12 wire should be used. It is advisable also to provide a receptacle or an outlet at some point in the laboratory for the operation of one of the self-contained refrigerator units, this circuit to be of No. 14 wire and to be mastered from the panelboard at the location of the instructor.

The physics laboratory will require, in addition to the lighting and clock equipment, etc., some provision, depending on the scope of the courses to be taught, for both high and low tension electric current at the instructor's and students' tables. The 110-volt service to the tables may be taken from the panelboards in the nearest corridor; it is to be preferred, however, that a separate panelboard be provided for each laboratory and all circuits for the tables, etc., controlled, under lock from this panelboard, the board to be located adjacent to the instructor's table.

The laboratory panelboards may be fitted with precision instruments, etc., or may be made up of only the switches controlling the different table circuits. In the writer's experience, a simple switch panel in each laboratory is all that is required, as when instruments are to be used and current experiments are to be made, instruments of the portable type may be used directly on the tables.

The instructor's table should be fitted with receptacles for 110-volt direct current, 110-volt alternating current, and for 10-volt direct current, a separate circuit carried from each receptacle to the panelboard. There should be three receptacles of the polarized type on the students' tables (for each student at the given voltages); these receptacles may be located on a raised shelf, as with double tables, or on the front of the table permitting easy connection for portable equipment; from four to six of these outlets may be connected on one circuit.

The conduit feeding the receptacles should be run in the floor construction, passing up out of the floor at the location of the table and looping from outlet to outlet. A satisfactory form of construction for this work consists of the use of the so-called "bulb tee," this set in the floor with a tapped bushing set flush with the floor (a brass plug being inserted in the bushing as soon as installed); when the table is in position the plug is removed and a short length of conduit installed passing from the bushing

to the table. This construction is waterproof, and in the event of a table being moved no unsightly conduits are left in the floor, as the short conduit can be then removed and the brass plug again screwed into the bushing. As a rule the tables are provided with the school furniture, and these tables are fitted complete with receptacles and other equipment, the wiring contract providing only for the wires and conduits to each table.

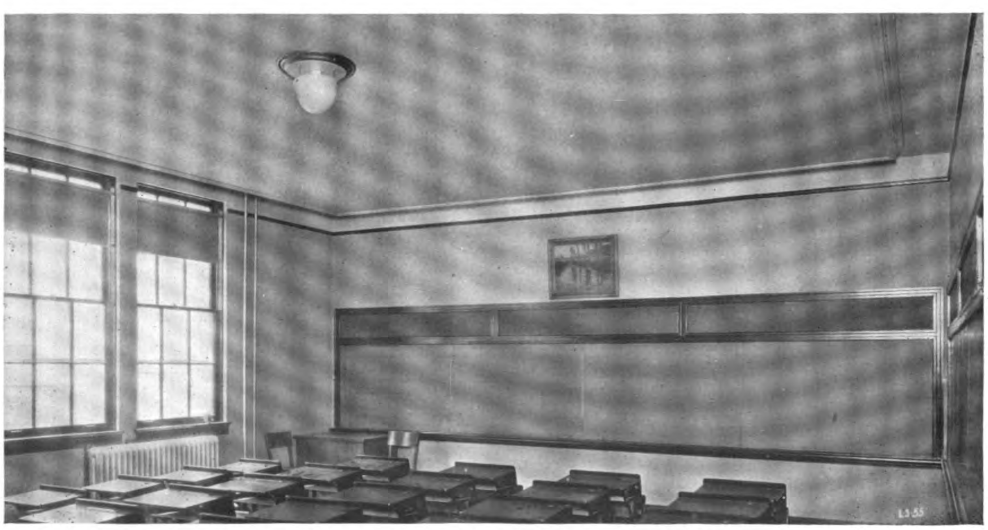
The 110-volt direct current and the 10-volt direct current are usually provided by means of two motor generator sets, each consisting of an alternating-current motor connected to and driving a direct-current generator, the 110-volt generator being also used to provide direct current for the operation of arc stereopticon lanterns in the lecture rooms; this set is usually of 5-kw. capacity at 110 volts, and the smaller set from 1- to 2-kw. capacity at 10 volts. The sets may be located in the laboratory or in the apparatus room. The larger set may also be used if desired for the production of direct current for operation of the moving picture machines in the assembly hall booth, if this is contemplated. This set should be of from 7½- to 10-kw. capacity, depending on the size of the picture machines.

A switchboard should be provided for the control of the two machines, this board to be fitted with a meter and voltmeter for both voltages, the field rheostats, the generator switches and the circuit switches to the different panel boards in the laboratories; also with switch for control of the lantern circuit to the lecture rooms and for the circuit controlling the direct current circuit to the moving picture booth. The motor switches controlling the two motors should not be on the switchboard, but should be connected on the wall at a point adjacent to the motors; these switches should be of the safety type and should be fitted with lock so that when the switches are open and locked the switchboard is dead and cannot be tampered with.

The lecture room should have its own panelboard, with circuits leading therefrom to outlets on the lecture table. The stereopticon lantern outlet should be set at the rear of the seats and should be of not less than 30-ampere capacity. It is well to provide four lighting outlets in the lecture room, two to be controlled by the usual switch at the entering door, the two remaining outlets to be controlled by a three-way switch at the instructor's table, with a second three-way switch at the location of the lantern.

Each base plug on the 110-volt circuit is a potential connection for the vacuum cleaners of the portable type. These machines are of great value in keeping the premises clean and have one advantage over the stationary type in that a long cord is more easily handled than a long hose, but for the heavy cleaning, ordinarily required in schools, the stationary type is generally necessary as being more powerful. With this portable type no special switching is required, the connection to the live plug being all the control necessary. With the stationary vacuum producer special arrangements must be made. Outlets must be distributed throughout the building so that all portions may be reached with a 50-foot length of hose. At or near each outlet should be a switch to operate the motor. This is best done by means of a remote control or solenoid which operates the starting device for the motor.

It is essential to determine the capacity of the machine to be used and to provide on the main switchboard the necessary cutouts, etc. The smallest or one-sweeper installation requires about 500 watts; the multi-sweeper type may require up to 5 horsepower. When the load to be carried is greater than a 5-horsepower motor can take care of, it is advisable to install more units rather than to increase the size and use only one producer. This means greater flexibility and economy in piping as well as power consumption.



Classroom in Theodore Roosevelt Junior High School, Wichita, Kas.
Showing special ceiling acoustic panel as described on opposite page
Lorentz Schmidt & Co., Architects

Acoustical Treatment of Classrooms

By LORENTZ SCHMIDT, A.I.A.

Lorentz Schmidt & Co., Architects, Wichita, Kas.

OUR public school system is keeping pace with the trend of American life toward speed, efficiency and high tension. Children enter the schoolroom younger and are hurried along much faster than even a few years ago; the tension is high from the first morning in the kindergarten. This condition cannot do otherwise than create a nervousness among the pupils, and every classroom noise, no matter how slight, has an unpleasant effect on the pupil. We are adding to this discomfort by constructing our classrooms of materials that intensify and prolong every sound. Outdoor conditions are strived for in purifying the air before it enters the room, and restful, harmonious colors are used in finishing the walls and ceiling. Why, then, is it not also desirable to obtain as nearly as possible the quieting and comfortable feeling of the open field? It will not be the purpose of this article to discuss the technical phases of the subject, but rather to deal with the conditions that obtain in the average classroom and the methods by which these conditions can be greatly improved by a simple and inexpensive treatment.

In the days before fireproof construction was used, when the interior walls were mostly of soft sand brick or wood, finished with wood lath and soft lime plaster, the period of reverberation was much lower than in the modern classroom where the materials are concrete, hard shale brick, cement plaster and metal lath. The room is usually as bare as possible and devoid of any sound-absorbing furnishings. The modern system of ventilation even requires that the windows be kept closed, thereby eliminating the possibility of the open window's becoming a means of sound absorption. Every change has led to developing the present classroom conditions; on the one hand the construction of the building has prolonged the period of reverberation, and on the other the increased efficiency of our school system has placed the pupils under a tension and nervous strain that was not general in former years.

In a fireproof building the period of reverberation in an average sized classroom is approximately 5.63 seconds when empty and 2 seconds when occupied by 30 pupils. In a room with a 12-foot ceiling height a sound will travel back and forth from the ceiling to the floor 183 times before it has spent its energy. A sound wave starting from any place and from any angle in the room will rebound on an average of 102 times during the period of its duration. This means that when the interior is thoroughly saturated with sound waves the audibility of the noise will be about 11 times greater (louder) than the original sound. There is usually at least one talking all of the time; there is shuffling of restless feet and handling of books, all of which creates a condition that causes an uncomfortable feeling, irritability and nervous strain that have an unwholesome effect upon the work of the classroom.

Before attempting to experiment and decide on materials and methods for improving the condition of a classroom it was necessary to place a reverberant which would balance with unity in relation to a point where the sound wave accumulation would be inaudible, or when with the interior entirely saturated with sounds the incidental or original sound waves only would be registered by the hearing senses. It was found that in the average classroom a reverberant of .7, with 30 pupils present, would eliminate 98.1 per cent of the audible sound wave accumulation, thus producing the effect desired.

The ceiling is left unplastered excepting for an 18-inch border, and in the unplastered area (about 80 per cent of the total ceiling space) are placed the sound-absorbing materials. The varying mechanical methods of securing the material are usually left to the judgment of the acoustical contractor, insofar as the efficiency of the material is not interfered with. Below the sound-absorbing material, leaving at least a space of 1 inch, is stretched a light weight canvas. This canvas is secured at the plaster line with a moulding, and because of the additional space required for the treatment and the canvas this moulding is usually about 2½ inches in depth, the result being that this panel on the ceiling improves the appearance of the room.

The thickness of the acoustical material depends upon the coefficient of absorption, and it has also been found that it improves the condition of the room to vary the thickness of the material at intervals of about 4 feet across the room. In rooms thus treated all noticeable reverberation is eliminated, and the results are far exceeding the expectations of those interested in the experiment. There is a quieting and restful atmosphere in the room that reduces the nervous exhaustion which is the cause of the teacher's growing less patient, and the pupils' becoming irritable and restless. There is an atmosphere about the room that is restful. There is no strain to hear what is being said, and the effect upon both teacher and pupil is very satisfactory.

Architects today are following closely the subject of quieting treatments in commercial establishments, as it has been conclusively proved that a quiet interior, without noise accumulation, means an increase in one's mental efficiency, and in many instances to a remarkable degree. The conditions which cause inefficiency and irritability in a commercial office will produce the same results in a classroom, and are remedied by an application of the same corrective methods that have been applied to the classroom.

Sanitation in School Buildings

By HERBERT L. PATTERSON, *Civil Engineer*
Boston Schoolhouse Department

SANITATION in a modern school building is far from being the simple affair it was years ago. The public school is the institution which makes the future citizens of this country; therefore, good sanitation in the school is a subject which needs continued study, as it vitally affects the health of the child.

Site. The first requisite in the intelligent planning of sanitation is usually an accurate survey of the building site. This will show the present elevation of the ground, the present and established grades of the adjoining streets, and the locations, sizes and grades of the sewer, surface water, water and gas pipes, electric conduits, manholes and Ys for connections to sewer. Where buildings are to be demolished on the site, due regard is to be given to the disconnection and removal of all old service pipes and to the sealing of openings in street mains; the old sewer connections must be carefully stopped to prevent gases' coming back into the new building.

Grades. The finished grades of the various floors of the proposed building had best be established so that from the lowest plumbing fixture there will be a pitch of ¼ inch to the foot to its connection with the sewer. A reduction of the pitch can be made to ⅛ inch to the foot, but it would be better not to resort to this expedient unless it is absolutely necessary; it is far better to raise the grade of the building. Connection should be made with a sewer if it is within a reasonable distance. Neither a septic tank nor a cesspool is to be installed excepting as a last resort.

Cesspools. If the subsoil is of gravel to suitable depth and surface water stands well below the grade, a cesspool is to be preferred to a septic tank. A cesspool might be 5 feet in diameter and 15 feet or more in depth, built of field stone, laid dry. It may be lined with brick laid dry.

Septic Tanks. Where neither sewer nor cesspool can be used, a septic tank could be installed. A tank based on 70 gallons per day per person and a capacity of 1 cubic foot for every 20 gallons is usually sufficient. The depth of the liquid and the width of the tank may be made roughly equal, and the length about twice the width. The liquid should not be less than 5 feet deep. A conductor system should never be connected with a septic tank, but such connection might be made to a dry well.

All material entering into school plumbing installation should be of high grade. It is important that cast iron pipe (extra heavy) be used for all drains and branches from the farthest fixture through the manhole to the sewer. The conductor and surface water pipe should be cast iron to a point 10 feet outside the manhole on the sewer side. From this point vitrified tile pipe may be laid to the sewer. The house drainage and conductor system are best kept entirely apart, with separate connections to sewer or surface water sewer. There should be running traps in manholes, the same sizes as sewer connections.

All wastes and vents of 2 inches or over should be of iron; of 1½ inches and under they should be of galvanized iron. The ends of all drains or waste lines should be vented into stacks which are carried through the roof to a height of 2 feet, or at least 2 inches higher than any parapet wall. All pipes not exposed should be run in chases or trenched with removable covers so they may be easily accessible for repairs.

Traps. There should be provided under each outlet from urinals a running trap with two handholes; on the house side an iron stopper may be calked in; on the sewer end calk in a T-branch with a brass cleanout which should be flush with floor slab; vent from the T-branch to a large vent that carries over the roof. Traps of laboratory sinks should be extra large in size so that the acid will be diluted immediately after leaving the fixtures and before entering the drain.

Water Supply. An adequate water supply must be provided for the building. Ascertain the water pressure at the main, also whether the pressure is subject to fluctuations. Having the water pressure in view, the service and distribution system should be designed accordingly.

An elementary school, generally speaking, requires a larger service line than a high school, as the elementary school, with the releasing of several hundred pupils at a morning or afternoon recess, will produce a high water consumption. The water supply should be brought to some readily accessible location, and the main reduced in size as the branches are taken off. Each fixture or tank should be provided with a separate stop valve, so that each can be separately controlled without affecting any other fixture or tank. The supply system, both hot and cold, should be provided with drip cocks so the whole system will empty by gravity when the water is shut off.

Water Distribution. From the main water supply it is generally sufficient to run branches, one each to boys' toilet, girls' toilet, boiler room, heating plant, sill cocks and general building water supply, the last supplying fountain, sinks, emergency rooms, teachers' room, office, laboratories, domestic science rooms, etc. The hot water may also be included. Supply pipes to fixtures should be proportioned so as to supply them adequately, and the distribution system should have the same

care in design as would be exercised in laying out any other kind of piping installation.

Hot Water Circulation. A hot water tank should be installed, and from it a main with branches to sinks, offices, teachers' room, etc., where hot water is desired. Return circulation should be provided from the highest fixture and the size increased as each riser is connected.

Fire Protection. Such protection in general is limited to standpipes and fire hose. The advisability of installing an automatic sprinkler system, excepting in stair halls, basement and storage rooms, is open to question. With proper supervision of plant the hazard from internal fire is small, especially since the majority of cities require fireproof construction. Statistics show that practically all school fires start in or about the heating plants. All storage rooms for wood, coal and supplies should be fireproof. Standpipes and fire hose should be installed so that any portion of the building can be reached by a length of hose of not exceeding 75 feet.

Pipe Covering. All hot water pipes require covering, usually asbestos or magnesia. To prevent condensation the cold water pipes should be covered so that the air may be kept from the cold iron surface. Alternate layers of wool felt and saturated asbestos paper, covered with a canvas jacket, have been found satisfactory.

Location of Toilets. The toilet rooms of an elementary school should be located in the basement, as the modern school has its basement entirely out of ground on at least three sides so as to receive a maximum amount of sunlight and air. In the high schools the toilet facilities are better located on each floor.

The cut shown on page 100 is a basement plan of an intermediate school building. As will be seen, the toilets are well lighted from the outside by a number of windows, allowing a free circulation of light and air. It will be noticed that the island location of closets allows free circulation around them. The number of closets is based on the number of classrooms, there being 1¼ closets for girls to each classroom, and ⅝ closet per classroom for boys. The urinals (33 inches of linear urinal per classroom) in the boys' toilets are placed against the walls, adjacent to the windows. The walls of the toilets are faced with salt-glazed brick or other non-porous, inexpensive surfacing material, to a height of 7 feet. Above this the brick is painted. The floors here are of asphalt, drained in the boys' toilet to the urinals and in the girls' toilet to floor drains. Much study has been given to the proportioning of closets and urinal spaces, and the number given here have been found to be sufficient.

Fixtures. Plumbing fixtures should be selected with care and due regard to their particular uses within the school. It might be well to say that range closets and urinals have no place in any building making any pretense to sanitation. Water closets should be of the siphonic action, wash down type, with vertical jets inside the bowls, having integral seats with raised integral local vents and tanks of 8-gallon capacity to flush by chain pulls. Pupils' seats are set generally from 13½ to 16½ inches high.

The integral seat has its faults and its good points, the one offsetting the other in favor of its use. The chief fault found with its use is the objection to its coldness when used by the pupils in cold weather, especially if the basement is not properly heated. The good points are numerous,—first, its cleanliness; second, the easy detection of filth by the pupil; third, the avoiding of constantly recurring expense in the repair of the seats. Urinals are generally of slate, without partitions excepting at the ends. Tanks are of a sufficient size in depth, length and width to give ¾ gallon of water to each linear foot of urinal at each flushing. Automatic flushing mechanisms are installed to flush urinals every five minutes.

Toilets and Lavatories. There should be emergency toilets and lavatories on each floor above the basement, also in women teachers' room, master's office, men teachers' room and nurse's room.

Sinks. Sinks are better located in corridors outside of toilet rooms, and the slate sink is preferred; the length is based on the number of classrooms—10 inches per classroom for small buildings, and 6 inches per classroom for large buildings. It might be well to say that the slate sinks are suitable only where cold water is used, and soapstone should be installed where hot water is used for domestic purposes, since the expansion caused by the heat from the hot water will crack and break the slate.

Drinking Fountains. Locate drinking fountains in sinks in all corridors. One fountain to each classroom is sufficient; the overflow from fountain is taken care of by waste pipe from sink.

Shower Baths. Shower baths should be provided in the proportion of one shower to each 40 pupils. Each compartment should be approximately 3 feet square and have a 5-inch swivel shower head. This is controlled by a mixing chamber which maintains the water at an even temperature at all times.

Swimming Pool. The water for the swimming pool should be maintained at an even temperature, which is accomplished by the water's passing over steam coils. During the day the water should be continuously passing from the pool, purified by reheating, and passing through an air curtain, after which it is again reheated and returned to the pool.

Inspection. Constant inspection should be maintained to prevent improper installation of plumbing and fixtures. It is money well spent to employ a competent man to see that the plans are followed and specifications lived up to.

EDITORIAL COMMENT

ENLARGED SPHERE OF ARCHITECTS' SERVICE

A VAST field for service is opened to the architectural profession in the problem of properly planning and building institutional and public buildings. There is no reason why this work should be limited to a few specialists, if well trained architects will give serious study to the important factors involved. There is also no reason why this work should be done on a "cut-rate" commission basis—an evil which will surely prove a boomerang to the profession, the individual architect, and especially to the unwise client who makes such a poor business arrangement.

Every individual connected in an official capacity with any institutional board or civic activity having the power to appoint architects for specialized work should seriously consider several facts:

That the services of a good architect will save a far larger sum of money than even a liberal commission.

That the architect's work, if properly done, is highly complicated and carried out under a heavy overhead cost.

That the architect's primary interest is to render good service, and that only the shortsighted business policy of the client will prevent this result.

That capable architects do not cut commissions or solicit business on a "cheap" basis—they cannot afford to do this.

That the waste resulting from poor architectural service (on which the client bets against long odds when he places a cut-rate commission) may be a hundred times greater than the apparent saving.

The first factor which the architect who is undertaking public building and institutional work is called upon to eliminate is that of *waste*. The waste of space, of structural cost and of unwise equipment in our public and institutional buildings has been appalling in the past. Evidence presented in recently designed buildings shows a distinct tendency toward its elimination. An interesting example of such waste was presented in the June, 1920 issue of The Architectural Forum by W. R. McCornack, Architect for the Board of Education of Cleveland:

"We talk more of standards and standardization than we do of the great, broad problems of planning and construction. Standardization is an excellent thing, but it can lead us into dangerous bypaths, as in this instance. In the Cleveland school system for years a certain desk was standardized. This desk required a room 25 feet wide and 32 feet long to contain 42 desks of a given size. By redesigning the furniture it was found possible to place the same number of desks in a room 24 feet wide and 28 feet long, thus bringing about a saving of 3,000 cubic feet per room, which at a cubic foot cost of 20 cents means a saving of $600 per room, or more than double the cost of furniture. In a 30-room building this means a saving of $18,000. This amount at compound interest for 50 years, or the life of a building, amounts to $20,000 per room, or $600,000 for a 30-room building—enough to meet the cost of constructing the building.

"What seem to be very minor matters in planning are full of danger and financial calamity to groups of school authorities continuing to pursue a policy of careless planning, and indict any architect or school man continuing to disregard the study of the problem of saving space. On the other hand, this reduction in classroom area does not show to advantage when comparing classroom areas with corridor areas, and we must be alive to these facts."

There are numerous possibilities open in this field for constructive architectural service. The type of school work exemplified in this number is certain to develop on the part of the building public a keener sense of appreciation of real architecture, not only in its æsthetic sense but in broader terms of practicability. So, too, will such service justify the larger fees which a good architect unquestionably earns, but too rarely receives.

The building public is undoubtedly beginning to discriminate in favor of that type of architectural service which admits the complexity of the modern building and endeavors through careful analysis of the peculiar demands of the individual problem to advise rather than to blindly obey the wishes of the client. The day of the architect who follows the path of least resistance and greater immediate profit is surely passing. Naturally, the architect cannot assume a dictatorial attitude, but he is in a position to make recommendations to the owner which a few years ago would have been considered entirely outside of his service capacity.

Nowhere is this fact more evident than in relation to the planning of institutional buildings. The architect who has made a careful study of bank planning knows more about the building requirements than does the banker himself. Why not? The architect has studied the plans of hundreds of banks; he has learned through the mistakes of others and gained knowledge through their successes. The officials of institutions of every type are too close to their own businesses or professions to have any but a distorted perspective of a new building problem. The architect has the opportunity of clearly visualizing a building which will meet all present requirements, and into the planning of which may be introduced that element of *flexibility* which will simplify future expansion.

SERVICE SECTION

of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

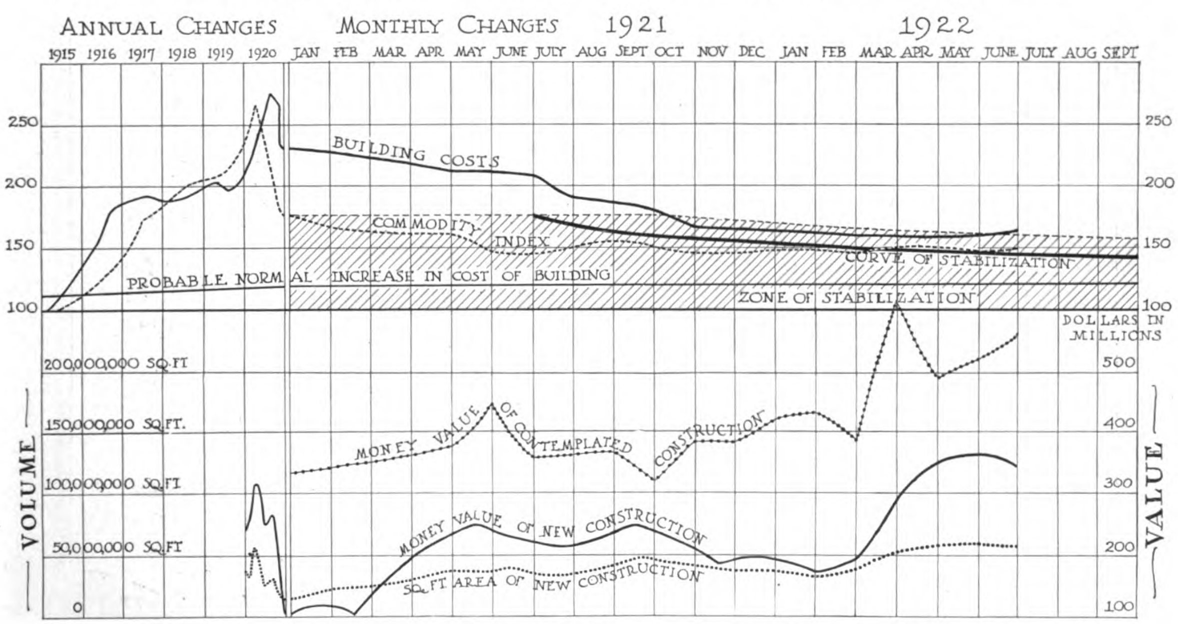
The Building Situation

NOTE

THE regular 8-page Service Section has been omitted in this School Building Number because of space limitations, but it will appear in following issues.

THE first six months of 1922 have shown a greater volume of investment in new buildings than in any similar period in the history of the United States. An examination of the chart below will show that this encouraging condition has been a result of the fall of building costs into the zone of stabilization. This decrease in cost, occurring in 1921, has made it possible to meet the demand for new buildings in this country by the first great wave of building activity. It will be noted that the index of building costs is continuing to rise slightly, and it may be expected that because of this fact, and primarily because of seasonal conditions, there will be some falling off in the volume of construction reported through the summer months. This rise is due, of course, to supply and demand, and is consequently temporary. Continued costs on this or higher levels would be out of line with other commodities, and would bring about a check on building operations. If costs continue fairly stable, there will probably be a recurrence of peak volume in building construction in September and October.

Judging from the reports received from architects, indicating an increased interest in the planning of institutional and public buildings of every kind, it is to be anticipated that a larger proportion of construction from now on will be in these classes of building. The fact that the first great speculative wave of building has passed and that activity is entering into the better class building field should certainly be encouraging to architects, because it means that a greater proportion of new work will pass through their offices. We are assured that there will not be any great further increase in costs, as production is rapidly meeting demand.



THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Barrett Specification Roofs

Bonded for 20 and 10 Years

Barrett Specification 20-year Bonded Roof on Corlett School, Cleveland, Ohio. Arch.: W.R. McCornack. Gen'l Cont.: C. N. Griffin Co. Rfr.: The Rudolph & Son Co., Cleveland Ohio.

Barrett Specification 20-year Bonded Roof on—Above: East Clark School, Cleveland, Ohio Gen'l Cont.: Jas. H. Wells. Rfr.: Norton Bros., Cleveland, Ohio.

Barrett Specification 20-year Bonded Roof on Hazeldel School, Cleveland, Ohio. Arch.: W.R. McCornack. Gen'l Cont.: Reaugh Const. Co. Rfr.: The Rudolph & Son Co., Cleveland, Ohio.

Left: Addison School, Cleveland, Ohio. Arch.: W R McCornack. Gen'l Cont.: C. N. Griffin Co. Rfr.: The Rudolph & Son Co., Cleveland, Ohio.

Right: Miles Standish School, Cleveland, Ohio Arch.: W. R. McCornack. Gen'l Cont.: The Drummond-Miller Co. Rfr.: The Dalzell Bros. Co., Youngstown, Ohio.

Cleveland's New School Buildings

TO house its army of 122,000 public school pupils, the City of Cleveland has provided many splendid new buildings. Architecturally, they are masterpieces—models of convenience, comfort, safety. And in line with standard practice the country over, most of these schools are covered with Barrett Specification Bonded Roofs.

One reason for the popularity of these roofs is, of course, their unequalled economy—moderate cost, long service, and no upkeep. But another reason, and a very important one, is their high fire-resisting qualities.

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THE ARCHITECTURAL FORUM

SEPTEMBER 1922

Making the concrete walks of the Chicago Union Station project wear-proof and weather-proof with Hard-n-tyte.

Checking the grind of a billion foot-steps!

For over twenty years the General Chemical Company has been at the forefront of chemical research and manufacture in this country. Hard-n-tyte is the latest contribution of its splendid staff of chemists. It is the successful result of long search for a concrete hardener that really hardens the surface and materially increases its life. It enables engineers and contractors to deliver a quality of concrete work far in advance of anything that has been possible heretofore.

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The Hard-n-tyte Specification

—makes concrete walks wear longer

BOOK DEPARTMENT

MEDIÆVAL FRANCE. Edited by Arthur Tilley, M.A., Fellow and Lecturer of King's College, Cambridge. 456 pp., 5½ x 9 ins. Price $8. The Macmillan Co., New York.

INCREASED interest which is being felt in studying the period generally referred to as the "middle ages," usually held to consist of those centuries which elapsed between the fall of the Roman Empire and the beginning of the renaissance, is resulting in the publication of a number of valuable works which are concerned with various phases of the subject. "Mediæval France" is a volume which deals with but a single country during this period, and it studies closely the structure of France, civil, military and religious, its languages, the rise and progress of different movements in the social and political orders which affected the lives of the people, and the building up of the foundation of general culture upon which was later reared the splendid structure of France during the renaissance. During a great part of the mediæval period France was the heart and center of European art, philosophy and culture generally, and at Paris there converged the roads traveled by the artists and students of the entire continent.

St. Wulfran's, Abbeville
Illustration from "Mediæval France"

While the major portion of the work is concerned with these general topics, from an architect's point of view at least all this exists merely as a background for the chapters upon architecture and the related arts, which flourish only when the times are propitious and which constitute the permanent expression, visible and tangible, of any age. These chapters are rich in the treatment of their subject matter, and within small compass present a helpful and fairly comprehensive view of the development of the several architectural styles with their more or less local variations, the different schools of sculpture and painting of various kinds, stained glass, illuminating and metal working, and the influence upon all this of the growth and centralization of civil power in the hands of the monarchy.

Architecture of the mediæval period was lavished upon structures of different kinds for ecclesiastical uses—monasteries, cathedrals, chapter houses and episcopal palaces—and its development was influenced to a considerable degree by the growth of the great religious orders such as the Dominicans and Franciscans, and even more so by the various reforms within the Benedictine order and the resulting new foundations of which Cluny was the most important as influencing architectural style. In the eleventh century 314 monasteries obeyed the Abbot of Cluny, who struck money in his own mint like the King of France himself, and within 25 years from its foundation the Cistercian order had spread over all Europe and numbered 60,000 brethren. With the spread of the monastic orders a great school of architecture arose, and while the passion for monasticism was at its height the abbeys, monasteries and other conventual buildings for several centuries eclipsed in size and splendor the cathedrals and churches of the secular clergy. The great minster of Cluny was the

largest church west of the Alps, and in many ways monasticism left its indelible mark upon the architecture of France. More than in some other countries architecture in France is inextricably a part of the life of a period, and its real spirit cannot be grasped without a study of the history of the epoch of which it forms the enduring expression. By presenting a view of these correlated activities, this work promotes a more accurate knowledge of the architecture of the epoch.

The history of France during this formative period presents many instances which illustrate the marvelous vitality of the nation. A calamity such as the Hundred Years' War would have meant the ruin of many countries, but France recovered, and Dr. Tilley predicts, not without good reason, that the same amazing vitality will raise present-day France and restore her to her place as the leader of Europe.

THE DESIGN OF STEEL MILL BUILDINGS AND THE CALCULATION OF STRESSES IN FRAMED STRUCTURES. By Milo S. Ketchum, C.E. 632 pp. 6 x 9 ins. Flexibly bound in leather. Price $6 net. McGraw-Hill Book Co., Inc., New York.

THIS work is a companion volume to the same author's "Structural Engineers' Handbook," though the two books are independent. The present volume is intended to present within as small compass as possible the calculation of stresses in framed structures and to review the subject of mill construction. In discussing the problems of stress both the algebraic and the graphic methods of calculation are described and illustrated with numerous diagrams, and from text plus illustrations the student should be able to obtain a reasonable grasp of the fundamental principles.

In Part I the author considers the calculation of stresses which occur in simple beams, portals, trusses, the transverse bent and the three-hinged arch. This part contains 40 problems covering stresses in all types of simple trusses. Part II goes into the calculations of deflections of trusses, calculation of stresses in statically indeterminate girders, trusses and frames and secondary stresses in trusses, elucidated by numerous problems and statements of others. In Part III, Mr. Ketchum takes up the designing and construction of steel frame buildings for mines, smelters, mills and other industrial structures, and gives a fully detailed design of a crane girder, a roof truss and a steel building, in addition to discussing the design and construction of floors, roof coverings, foundations, corrugated metal, doors, windows and other related subjects. Being a revision of the work originally published in 1903, this new edition presents the latest practice of engineers and builders in the various phases of work which the volume covers.

THE AMERICAN HOUSE. Edited by Charles S. Keefe. 219 plates, with descriptive notes, 9 x 12 ins. Price $10. U. P. C. Book Co., Inc., New York.

EACH year the work in American domestic architecture shows certain examples which by reason of their excellence in various ways might be said to constitute a class by themselves. These homes are sometimes large, but quite as often they are of moderate size or even small, and their pleasing qualities are sometimes the result of rather close adherence to precedent but at times are due to the free use of motifs from more or less

related periods, handled with the liberty of judgment which would be claimed by anyone of good taste at any period. A collection of plates showing many of these houses has here been brought together, classified as to style. While perhaps no one of the examples included has not already been published in some one of the architectural journals or in one of those publications of somewhat broader scope in which gardening and house furnishing also form part of the field covered, it is useful to have these fine examples collected in book form so that they may be readily referred to.

Mr. Keefe has arranged the volume according to different styles, into one chapter—"Colonial Houses"—there being gathered structures designed in the correct though slightly austere style of New England and other houses in the generous, ample styles used in Pennsylvania, as well as other examples of the southern colonial as used in Maryland or Virginia which exhibit a certain restrained luxury of treatment. More formal are the examples classified as "Georgian," houses for the most part of brick and of small or medium sizes as well as of those of larger extent with which the term "Georgian" is generally associated. Other chapters are devoted to houses of the Italian and Spanish types in which stucco is generally used for the walls and tile for the roofs. Another chapter is devoted to the consideration of houses which do not fall readily into any one of these classifications—several examples of the use of the French types, the styles in vogue in England during Tudor and Jacobean times, and of what is generally called the "modern English" type. An important detail of the book is its presentation of excellent illustrations of interiors, particularly useful since plans of the houses are also included.

CONSTRUCTION COST KEEPING AND MANAGEMENT. By Halbert Powers Gillette and Richard T. Dana. 582 pp. 5 x 8 ins. Price $5 net. McGraw-Hill Book Co., Inc., New York.

SINCE a large part of success in the field of contracting and building depends upon close economy in cost accounting, it follows that systems for such accounting are of vital importance. The success of the volume entitled "Cost Keeping and Management Engineering," published by this firm in 1909 and reprinted in 1916, has led to the preparation of the present work which sets forth the latest developments in the field. As far as is known this is the first book written on the general subject of cost keeping for managers of engineering construction; such keeping of costs differs materially from systems which might be used to advantage by manufacturers, for example, and in this volume there are reproduced the record blanks or forms used by many successful contractors and builders.

It may easily be seen that a system which is well adapted for a large concern, employing a large staff and engaged in great construction projects in different sections of the country, would be unsuited to the needs of another concern operating upon a much smaller scale, and one chapter of the book is entitled "Bookkeeping for Small Contractors," containing cost forms which have proved to be useful to contracting and engineering concerns in many places. Closely related to the subject matter of the book is the use of various office appliances, such as time recorders and comptometers, and a consideration of their advantages is contained in the work.

FORM IN CIVILIZATION; COLLECTED PAPERS ON ART AND LABOR. By W. R. Lethaby. 242 pp., 4¼ x 6¾ ins. Oxford University Press, London and New York.

IT is always a pleasure to pick up an English book of essays, a form of writing in which the English easily excel. While but comparatively few American writers would take the trouble to closely examine a subject and to discover the sources of origin and the real meaning of what presents itself to the eye, the Englishman as a preliminary to writing is apt to conduct a searching examination into the causes which produce a given result, to marshal his data in orderly fashion and, having planned the presentation with due care as to proper sequence, to proceed to develop the subject in a logical way.

Such a work is the volume in hand, a collection of essays contributed to various English periodicals or the revised text of addresses made before different architectural or educational societies. Mr. Lethaby writes much and well on topics more or less closely related to architecture, and much of the interest of his writings lies in the fact that he does not hesitate to call attention to the shortcomings of the age and to compare the present state of things to what obtained in the good old days "when ugliness, and particularly vulgarity, had not been invented." No real progress in any department of effort is to be made until by recognizing the need of progress a vision of better things is presented. Mr. Lethaby's writings are a help in both directions, for besides pointing out the need he discloses a glimpse of what might be. Particularly helpful is Chapter XIV, an essay entitled "What Shall We Call Beautiful?", reprinted from the *Hibbert Journal.*

NEW BUILDING ESTIMATORS' HANDBOOK. By William Arthur. 1002 pp., 4½ x 7 ins. Flexible binding. Price $6. U.P.C. Book Co., Inc., New York.

THE value of this work is abundantly proved by the fact that it is now appearing in its twelfth edition, vastly enlarged since it was first published in 1904 with 150 pages. The volume, "Estimating Building Costs," which was reviewed in these pages in THE FORUM for March, is intended to act as a "feeder" to this larger and more complete work which covers the entire field of estimating all branches of building costs.

As the complexity of the modern building increases the architects and engineers by whom they are planned, as well as the contractors and builders by whom they are erected, find growing need of all the help which can be given them. Cost estimating in this field is both difficult and responsible; even the most experienced estimator is far from infallible, and errors are easily made, sometimes meaning the loss of business through naming a figure too high or, what is perhaps even worse, the taking of a contract at too low a figure and suffering a consequent loss. Estimating is at best exacting and laborious, and any help, short cut or improved, time-saving method which can be advantageously employed will be welcome. To provide this help is the purpose of this volume, and since it has been prepared in view of the experience gained from many years of practice in the estimating field, it abounds in precisely the information which is needed for the successful estimating of building costs. It would be almost invaluable to most estimators and a helpful mentor to those of greater experience. It would also be a valuable addition to an architect's office equipment.

THE EDITOR'S FORUM

THE OUTLOOK FOR BUILDING

THAT the structure of American business rests upon a sure and solid foundation is proved by many facts. Notwithstanding such undeniably disturbing factors as the strikes now in progress at the coal fields and on transportation lines, every consideration points to the settling down of business conditions to what bids fair to be steady prosperity for a number of years.

Conditions, particularly as they relate to the building industry, formed the subject matter of an address by J. E. Rhodes, Secretary-Manager of the Southern Pine Association, delivered before a special meeting of subscribers at Memphis on August 10. The speaker dwelt upon the fact that during the first six months of the present year in 163 American cities and towns building permits to the value of a billion and a quarter dollars were issued, an increase of 75 per cent over a like period in 1921. This large increase in building construction is not confined to value but applies as well to the number of square feet of floor space. Conditions among manufacturers of building materials point to prosperity almost without precedent; that bumper crops are general this year, the result of highly favorable growing conditions during July, was indicated by the government's August crop report; bank clearings, always an infallible indication of a country's prosperity, show figures which would justify a high degree of optimism.

RESOLUTIONS BY BOSTON ARCHITECTS

EXPRESSING its position on several questions now being widely discussed and involved in a trade agreement under negotiation by the employer and labor groups of the building industry, the Boston Society of Architects issues resolutions adopted June 29 by its Executive Committee.

These resolutions deal with the items of wages, hours, overtime, apprentices, duration of agreements, and settlement of disputes, and under each heading there is explained the position which the Society assumes. In the matter of wages there is deprecation of the granting of a material increase over the present wage rates being urged in view of the present demand, and particularly of the establishment of a permanent wage-scale determined upon the basis of a temporary, abnormal and partly artificial condition. In the matter of working hours the position taken is that a 5-day week for certain trades is not only unnecessary but illogical unless such a week is granted to all the trades in the building industry, which is not now being urged. The resolutions point out the tendency of a 5-day week to increase the number of workmen engaged, to create a need for overtime labor at a much higher cost, and as generally placing a burden of expense and confusion on the industry without to any degree improving the conditions of seasonal unemployment.

The immediate attention of both employers and labor is directed to the speedy development of a steady supply of properly trained workmen, vitally necessary to the proper growth of the industry. The resolutions maintain that agreements should have a greater degree of permanence than is now customary and should contain within themselves means for the periodic adjustment of wage scales instead of being made for short terms and subject at their expiration to debate and renewal, often under the stress of temporary conditions. Recognition is also made of the need of a permanent system of arbitration for the adjustment of disputes.

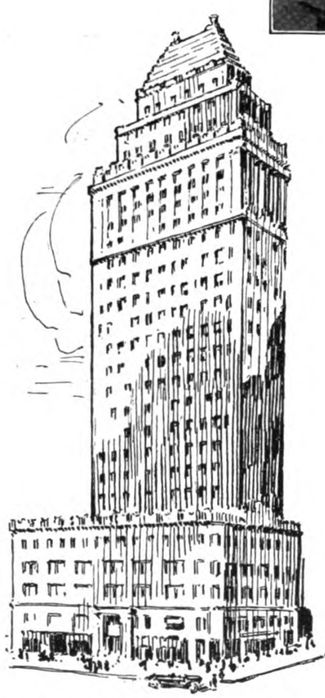
MANUFACTURERS' ADVERTISING TO ARCHITECTS

MENTION has already been made in THE FORUM of efforts now being directed toward co-operation between advertisers and architects. This movement has now led to the creation of a Producers' Section of the Committee on Structural Service of the American Institute of Architects to outline plans as to the character of such advertising, particularly as to size, form and content of printed matter and as to furthering the use of the Standard Construction Classification already adopted by the Institute.

Unless one were familiar with the subject it would be difficult to realize the waste and extravagance which have long characterized the advertising which manufacturers of materials have issued to architects and engineers, such advertising often taking forms which are wholly impractical or else failing in some other way to meet the needs of the profession. The most unfortunate part of the situation is that architects are only too ready to welcome and use advertising which gives promise of being really serviceable in any way. Proof of this is found in the care with which some particularly valuable bit of advertising matter is treasured in an office for many years and through various changes of administration.

This Committee has now under review the entire subject of advertising in its relation to architects, and recommendations may soon be expected looking to the promotion of closer relations between manufacturers and architects and co-ordination of efforts which will insure the presentation of data and information in just the manner and form which will render it most useful.

Telesco partitioned offices with secretary's office enclosed in Telesco rail, paneled to match



50 East 42nd Street, New York City. Equipped with Telesco Partition. Jardine, Hill & Murdock, Architects

Is Office Partition Furniture or Fixture?

You will probably answer at once by saying it is both furniture *and* fixture.

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Telesco Partition is a fixture perhaps, in so far as it performs the duties of a partition, but there the similarity ends. It is just as much furniture as an office file, a desk or chair. You can place it where you want it, then move it wherever you will, whenever you will.

There is no plaster to smash, no nailed wood to pull apart and destroy. Telesco is erected with screws; so a screw driver is the only tool needed to move it.

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It is furniture in finish as well as construction.

Send for our new booklet. It gives details of the complete Telesco construction.

12C

Improved Office Partition Company

25 Grand St. Elmhurst, New York, N.Y.

THE ARCHITECTURAL FORUM

VOLUME XXXVII NUMBER 3

CONTENTS for SEPTEMBER 1922

PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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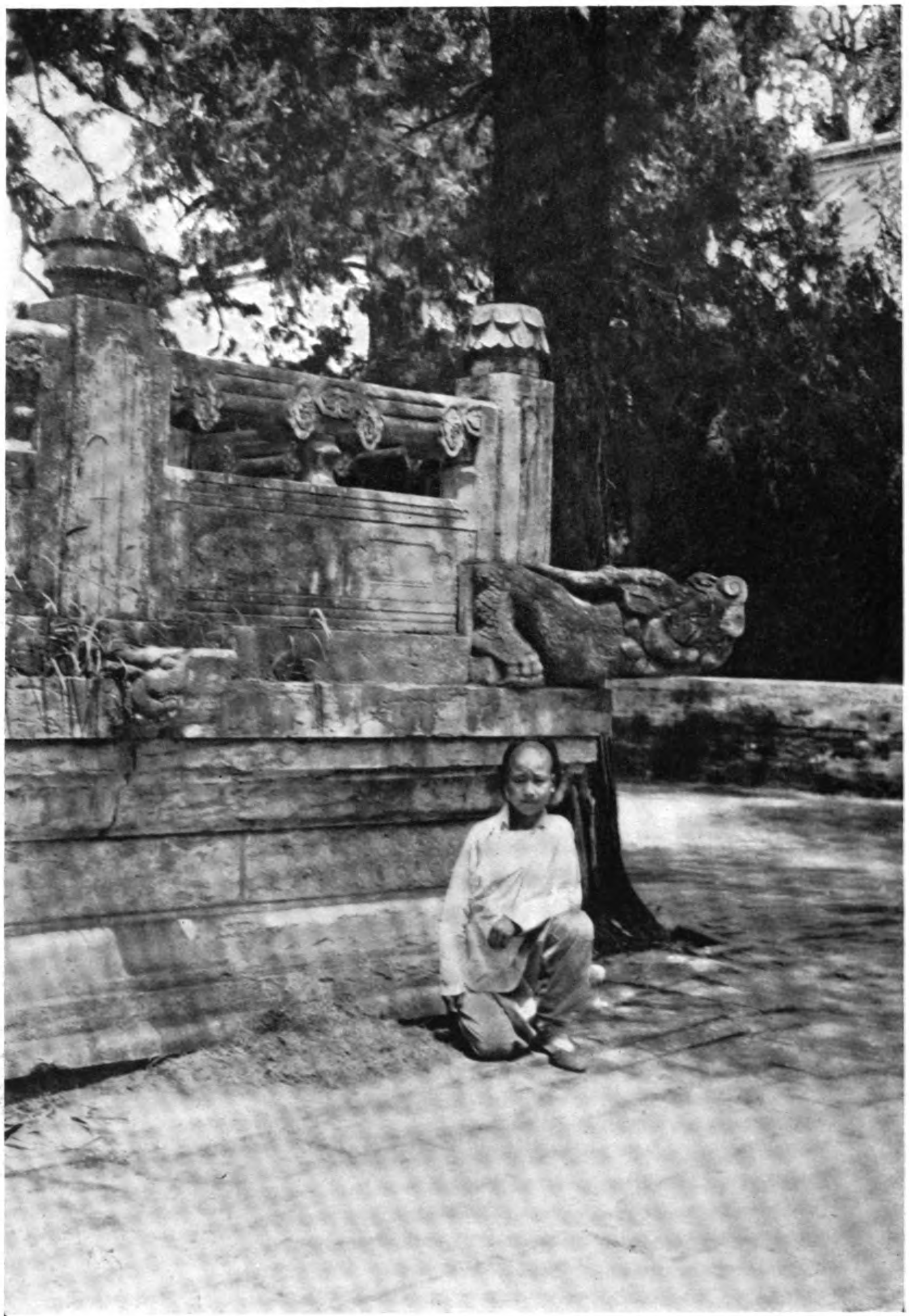


DETAIL OF TEMPLE AT THE BIRTHPLACE OF CONFUCIUS, CHEFU IN SHANTUNG

Dragon heads on the stone terrace simulate the carved beam ends of early wood construction. Foliated motifs are profuse in proximity to the structural shapes, as in the lotus headed posts or carved facia behind the figure.

Photographed by Edwin L. Howard

The
ARCHITECTURAL
FORUM

VOLUME XXXVII | SEPTEMBER 1922 | NUMBER 3

A Chinese Temple in Formosa

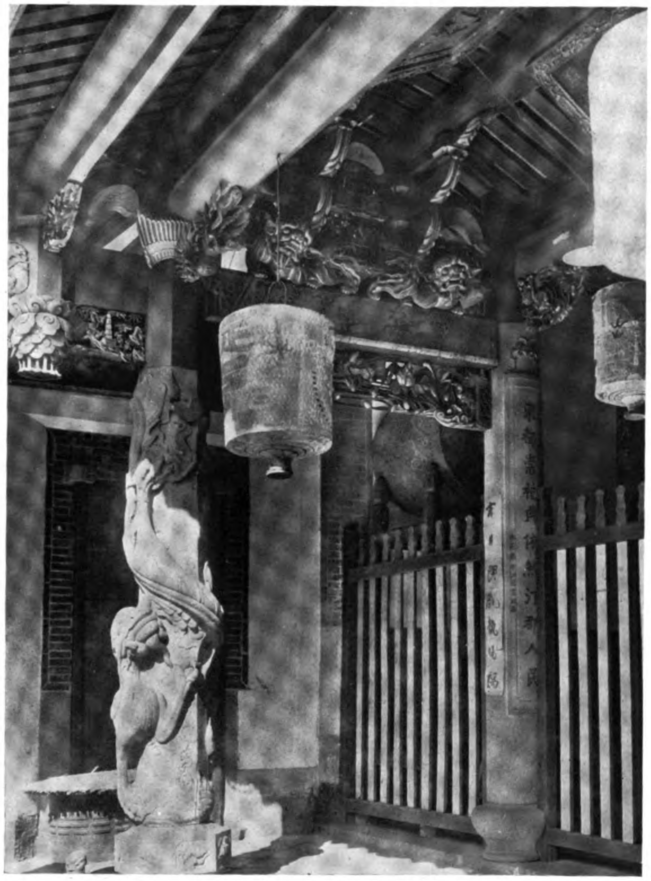
By K. W. DOWIE

THE well known conservatism of the "heathen Chinee" is nowhere better demonstrated than in the art of building. In other countries to see a building is to be able to date it fairly accurately, but in China the same rules have been adhered to for so long that the appearance of a temple such as that described here gives us no sort of clue as to whether it has stood for 30 years or a thousand. Obviously, however, a type of architecture which could endure for so long must have its good points.

A Buddhist temple of the type usually found on unrestricted sites, it is beautifully situated on the side of a little hill, facing southwest. Temples in crowded towns usually do away with all but the center section, enclosed between the two long walls, and the priest or caretaker sleeps on a bed placed in the rear, not far from the chief idol; here the caretaker has a whole wing to himself, and another wing is rented.

The plan is simple, the worshiper passing through a highly decorated entrance porch to the inner arcades leading around the unroofed court or impluvium to the main building in the rear. As the altar containing the chief idol is placed against the rear wall, where no light can penetrate excepting from the impluvium, we have an effect, doubtless sought for, of gradually increasing darkness and mystery as

The Prevalence of Earthquakes Has Kept Chinese Buildings Low, Affording a View of Their Roofs Which Are Often of Striking Beauty

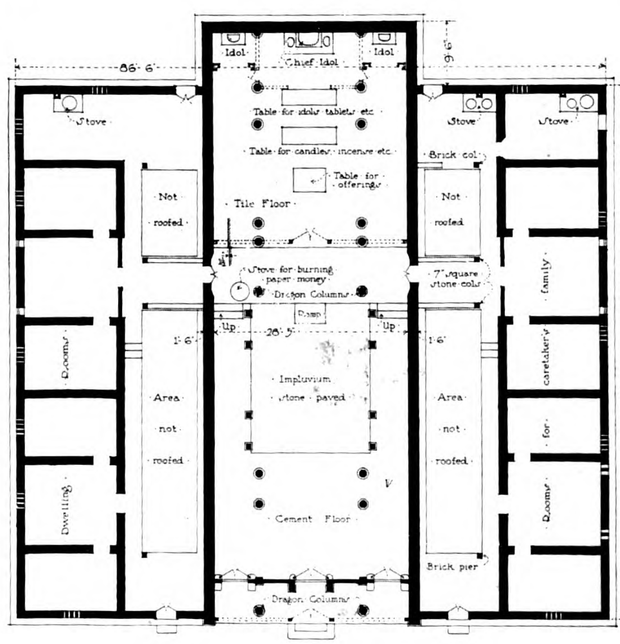


Detail of Dragon Column and Brackets in Rear.
All Brackets Are of Wood and Gaily Painted

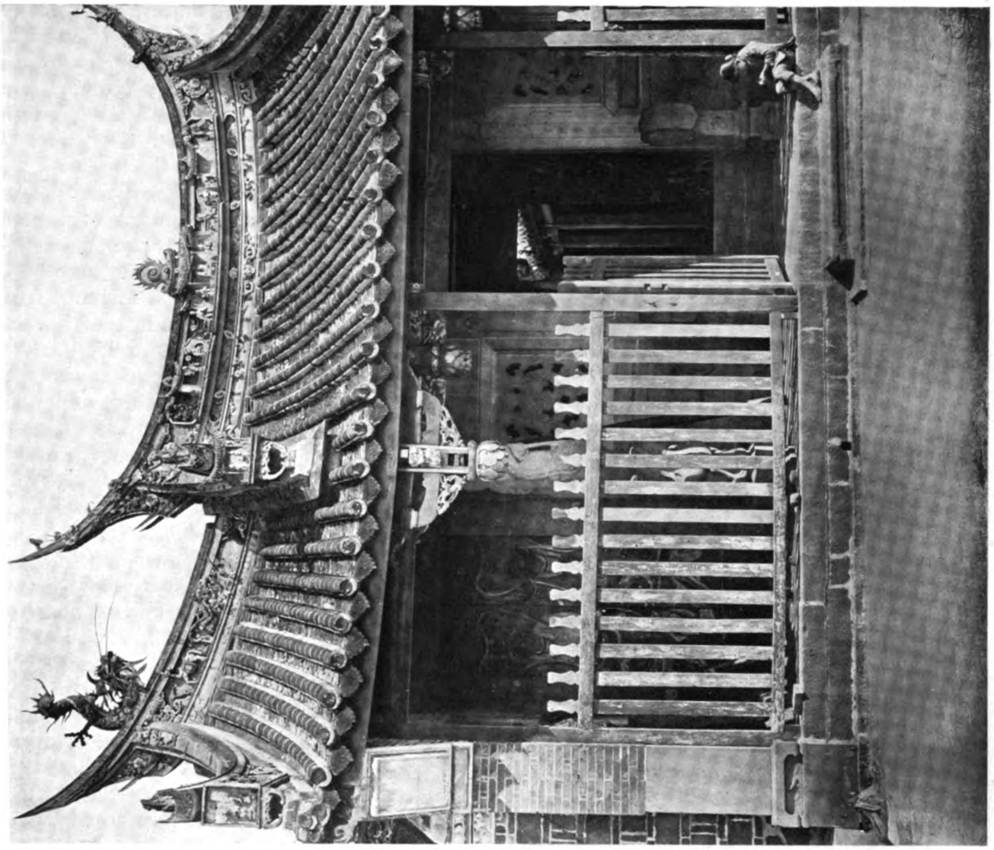
the idol is approached, reminding us of the temples of Egypt. In scale, however, there is no temple in China which can compare at all with the great buildings of Egypt or Greece. Chinese materials, too, are more perishable. Worship in China is for the most part individual, and its paraphernalia is very simple, consisting of a table for the god in a small space curtained off from the rest of the building, with other tables in front for tablets, idols and incense, another empty table upon which the worshiper may place his offering (usually of food), and a stove where he may burn imitation money. This stove is as often as not without a flue, the smoke escaping through the impluvium.

Foundation walls are of cobble stones, and those above these are either of brick plastered over or of a thick tile 7 x 9¼ x 2¼ inches; courses of headers alternate with tiles set on edge, the hollow voids being filled with mud and pebbles. Variations in color provide a most interesting wall surface. This material being scarcely strong enough for door jambs, they are usually made of brick. Door heads are beamed in stone, with occasionally a semi-circular brick arch. In warm localities, the windows shown on front and sides, consisting of three or four narrow slits 4 inches wide, exclude the worst of the heat and at the same time satisfy Chinese demands as to the amount of light necessary, so there is no great objection to them. The Chinese, however, have conceived of nothing better than these for their sleeping rooms, which constitutes a serious menace to health.

Important columns are always of stone. Dragon columns, made of one piece of stone and representing the labor of one artisan for nine months or a year, may still be made for a comparatively small cost and are a product of the age-old system of apprenticeship still in force in the various guilds. Notice the simple chamfering of the corners of square columns, producing a sort of imitation entasis on the diagonal view. All columns are made without caps. The universal practice is to stop the stone column a couple of feet below the roof brackets and to splice it there to a wooden column of equivalent section, so that this latter may be mortised to receive the wooden brackets supporting the roof. These brackets are often of great beauty, as may be seen from the illustrations. After being elaborately carved in full relief they are covered with bright paint with reds, blues and golds pre-

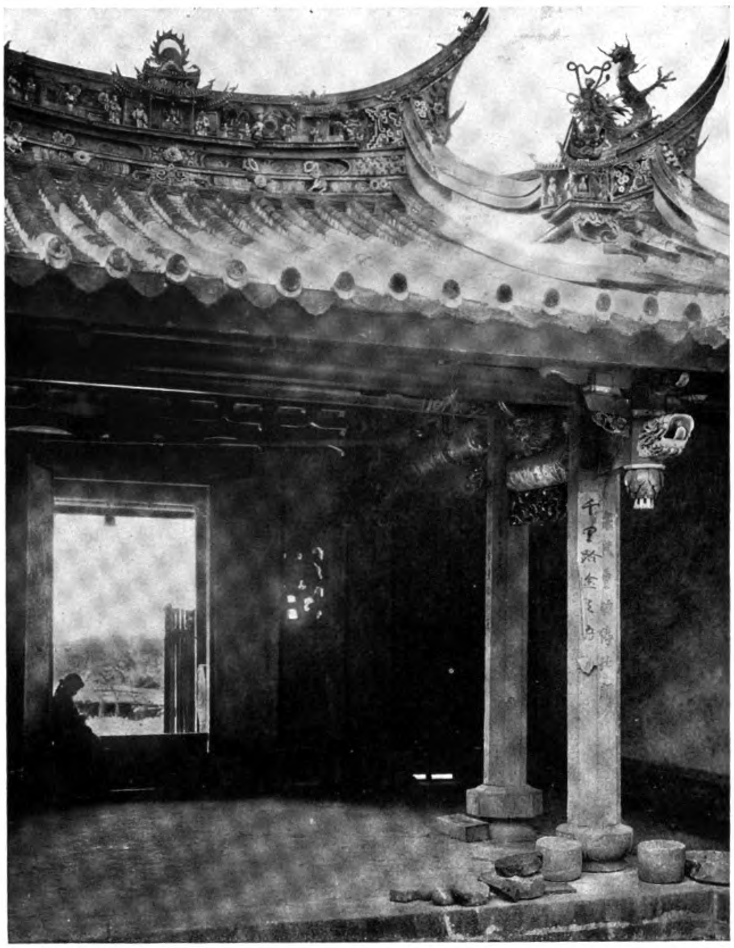


Plan of the Temple and Its Accessory Wings



Detail of Entrance, Rich and Gorgeous with Correct Architectural Lines and Lavish Use of Color and Gold

Looking from the Entrance Porch Diagonally Across the Impluvium. The Caretaker Is Also the Priest



Looking from the Impluvium towards the Entrance Porch

dominating. A remarkable feature in Chinese architecture is the complete absence of the truss. Not only this, but it seems never to have occurred to these builders, as Russell Sturgis points out, to use a diagonal tie or strut of any kind. Brackets are always rectangular, a system resulting in great extravagance in the use of lumber in all their roofs, though certainly producing an effect more harmonious and restful than that caused by diagonal members, and at the same time satisfying the demands of the eye as regards strength.

The point where the Chinese "lets himself go," however, is on the ridges. Hip roofs are usually avoided, the delicate curves of ridge and gable eaves giving a very distinctive note. These ridges are built up of brick and cement, reinforced by iron rods at the turned-up corners. Dragons perched jauntily near the ends of the main ridges keep away evil spirits, and a brilliant color effect is given these and the ridges themselves by a covering of broken bits of glazed tiles of various hues. Tiles in Formosa are thin, and laid with from 2½ to 3 inches to the weather. Pan tiles have a very slight curve to them. In ordinary work, cover tiles are of the same section, laid reversed, but in the main temple roof a nearly circular cover tile will be seen, with a treatment of the eaves that gives a most interesting shadow.

Inscriptions, whether written on cloth banners, carved on stone columns, or carved out of wood and suspended in appropriate places, are a striking feature of interiors, and each character is a work of art in itself. To quote from Chamberlain in regard to Japanese writing, which of course is based on the Chinese: "If this writing is to us a mountain of difficulty, it is unapproachably beautiful,—above all, it is bold, because it comes from the shoulder instead of merely from the wrist. A little experience will convince anyone that in comparison with it the freest, boldest English hand is little better than the cramped scribble of some rheumatic crone. One consequence of this exceeding difficulty and beauty is that caligraphy ranks high in Japan (and China), included among the arts." The inscription seen over the tables in front of one altar reads: "Great virtue will save the Universe," surely a laudable, if noncommittal, sentiment! The beauty of the paneled wood screens in Chinese temples needs no comment. Altar tables are sometimes elaborately paneled in front, with full relief wood carvings, the cost running as high as $1,500 or $2,000 for a single table.

It may seem a far cry from the architecture here illustrated to what we require to meet our needs in America, yet there are many ways in which Chinese examples can help us. Surely there is something to be said for making the roofs of our one- and two-story work more interesting. There seems to be in Oriental peoples an unerring instinct for balance and proportion, shown in their massing and extending also to matters of the smallest detail, as will be seen by a close examination of any Chinese ideograph. In this utilitarian age it is refreshing to turn to a building where the religious impulse compels the builder, and where things are made as they are for the sheer delight of having them beautiful.

These ancient temples were built before the beginning of the trades unions, and their architects were undisturbed by strikes; but even in the "unchanging East" conditions are changing, and Chinese architecture is gradually losing something of its charm as fashions come in from the outside.

Architectural Design and Structural Requirements of Loaning Institutions

ONE of the important elements of progress indicated in the present period of building activity is the enforced improvement of building design and construction developing through the pressure of loaning organizations.

From the architect's viewpoint it is important to realize how definitely this power is being exercised and developed. Unquestionably during coming years higher standards of plan efficiency and more rigid requirements of structural integrity will be employed by those who acquire buildings as collateral for loans. Consequently, a rapidly developing architectural service requirement is the provision of building plans and specifications which will encourage more favorable appraisals.

Architects will receive many practical suggestions from this article which presents the methods used by the Metropolitan Life Insurance Company for protection against bad building and mortgage loans.

THE volume of new building operations which has developed during the past 18 months offers an unparalleled opportunity for analytical study to determine basic trends, dependable policies and modern developments in the construction industry. There can be no question but that many precedents are being established at this time and that improved relations are being developed between the important elements of building finance, design, construction and maintenance.

Among the factors which are contributing more strongly than ever before toward increased efficiency of purpose and the elimination of waste in building space and investment is the establishment of more exact requirements on the part of loaning institutions. Finance, the strongest influence in the building world, has power to establish high standards of design and construction in all classes of buildings throughout the United States. Judging merely from a business point of view, the controllers of finance are wise to encourage high standards of design and construction, because the best security for a mortgage loan is a well planned and durably constructed building. Architects too are deeply concerned in better standards of building, and they will unquestionably approve of the requirements of loaning institutions which tend to encourage and secure a greater appreciation of architectural design and structural integrity.

At this point we wish to emphasize the growing appreciation by loaning institutions and real estate interests of the value of good architectural design, particularly that element of design which may be termed planning efficiency. An analysis of existing buildings unquestionably shows that there are two great elements of structural waste in the United States. The first is that of waste space due to inefficiency in planning, and the second is that of rapid obsolescence due to poor construction. Good architectural design is a general term conveying different meanings to different classes of individuals. In years past the term good architectural design carried principally an æsthetic meaning and developed varying degrees of appreciation on the part of the building public and of loaning institutions. These institutions are learning to interpret the term good architectural design as meaning not only æsthetic quality but a high degree of practicability in the laying out of space in a building. The average loaning institution would not call a building good from an architectural viewpoint even though it possessed the æsthetic qualities of a masterpiece in design unless it were well planned. Conversely, it would not term an ugly but practical building good architecture. Loaning institutions are learning to recognize fully that point at which good design and efficiency of purpose may unite to create the type of building which will meet with public favor and consequently maintain its collateral value even during periods of inactivity in the real estate market.

One important question for the architect to decide in relation to this demand is whether he will become its leader or its servant. We have in the architectural profession outstanding examples of leadership in the development of beautiful and practical buildings. The profession can, without undue egotism, take credit for a large share of the progress in modern building construction. It is therefore a commendable condition that loaning institutions and building owners are learning to appreciate the benefits to be derived from real architectural service which can be directed by constructive imagination to justify loans and investments without sacrificing those qualities of proportion, scale and harmonious color which should influence all city and suburban districts in the matter of building development. We may therefore assert without qualification that loaning institutions are

learning to place a practical valuation on good architecture in its broadest sense. An excellent example of this condition may be presented by a consideration of the experience of what is probably the greatest loaning institution in the United States —the Metropolitan Life Insurance Company. This company has set a fine example and one of far-reaching benefit to the architectural profession, first by making use of the services of an architect to aid in safeguarding its building loans, and second, to encourage the development of definite requirements which tend to secure good construction.

An application for a building and permanent mortgage loan submitted to the Metropolitan Life Insurance Company passes through two stages of consideration. These stages might be termed the business analysis and the technical analysis. The business analysis is made by the department headed by Walter Stabler, the comptroller of the company. In this department the feasibility of the building's location and plan is considered. If it is a building designed for investment purposes a careful study is made of the possibilities of rental income, maintenance cost and other items which go to make up the building manager's statement, and which determine the success of the building from a business viewpoint. In this article, however, we are more directly concerned with what we have termed the technical stage of considering a loan application. This relates to architectural design (in its broadest sense) and the construction and equipment of the building. This is the department directed by D. Everett Waid and fully described here.

Naturally these two departments co-operate closely in the consideration of a mortgage loan application, and the fact that considerable stress is laid upon efficiency of planning can be no better demonstrated than by referring to the unusual building venture for which the Metropolitan Life Insurance Company has broken ground in New York within the past few weeks. This is the construction of a large group of apartment houses designed by Andrew J. Thomas, an architect of New York who has devoted years to the study of efficiency and space-saving in the planning of apartment houses, and Mr. Waid, as architect for the buildings erected by the Metropolitan Life Insurance Company. Through his years of experience in the consideration of plans submitted for mortgage loans he has had an unusual opportunity for a first-hand study of practical planning and practical construction methods. The plans of these buildings and a description of the project and its purposes were presented in the July issue of THE FORUM.

In considering this developing relation between architecture and finance it is significant to realize that although the building world has only recently been aroused to the need of more accurate methods in building finance, the officers of the company years ago perceived the serious losses which are sustained by placing mortgages on defective buildings. Beginning in 1902, they commissioned Mr. Waid to review drawings and specifications of new buildings which were prospective security for the company's mortgages. Mr. Waid's work has been singularly successful, and today his system is so well established and has been so well tried out in practice that its exact method of operation should be widely understood among architects, because if its use became general, architecture would benefit immensely, perhaps more than by any other means.

In order to understand the character of the Metropolitan's financial policies in regard to buildings, one may do well to compare them with the methods in common use among lending institutions. Most interests exercise some supervision over their loans, but the extent of this oversight varies greatly. In too few cases can it be said to include scientific appraisal. Too often a property is appraised in a general way, the individuals who place the loan judging as well as they can the value and desirability of the site, the general suitability of the design of the building for the purposes intended, and the financial standing of the builder or of the investor who is responsible for carrying out the building operation. Having taken these precautions, the mortgage company usually endeavors to protect itself further by requiring a heavy amortization of the loan. Such a method may have been thought satisfactory in former years when the principles of real estate operation were not so well understood, but today the great increase in cost of construction and the costs of operation and of maintenance, together with the remarkable progress made by architects toward more economical design, have awakened financial interests to the need of being more careful in placing loans.

It is quite apparent, therefore, that exercising judgment as to the general character of the design is not enough. A more scientific method is required which shall accurately determine the bearing of each feature and each detail of the design and of the construction on the financial value of the building. In such a method of survey a most important consideration is the economy of the architectural plan. A building must compete with other buildings of its kind, and its promoters should make a minute cost-and-income analysis of the architectural plan in order to determine whether it contains any waste space which may lower the income or whether it has other plan defects which may make it less desirable in the eyes of tenants and hence threaten vacancies or a lowering of the rental scale. Defects such as these cannot be reached by amortization. Although good in itself, amortization is often used in real estate as a means of passing on the risk to the builder. It is not sound business. Indeed, many communities are burdened with uneconomic real estate which causes loss indirectly to the financial interests through the blighting effect of depreciated properties in their neighborhoods. Anything which injures the prosperity of a community injures the financial institutions in the community. Particularly is this true of hous-

ing. Wherever too large a proportion of salaries and wages goes into expensive housing, every business and industry in the community suffers.

These general principles, which should be applied in judging the value of a building on which a loan is placed, are highly developed in the system employed by the Metropolitan, in striking contrast with older rule-of-thumb methods. Like any efficient method of review of so complex a thing as a building, the distinguishing feature of the Metropolitan's system is its thoroughness. Mr. Waid follows a building project carrying a Metropolitan loan, beginning with its earliest inception and continuing through all stages to completion. Often a builder approaches the company before his architectural plan is worked out, with the purpose of finding out whether its officers are favorably inclined to lend on a building of a certain type in a specific location. In such a case, the prospective borrower is often informed that a loan will be made on the proposed building with the proviso, embodied in the loan contract, that the drawings and specifications shall be subject to the approval of the lender's architect. If the working drawings are completed at the time the application for the loan is made, Mr. Waid reviews them and he may approve the drawings and specifications either as presented or with certain modifications or revisions—or he may disapprove them entirely, in which case the loan is then refused by the company. It is more satisfactory both for lender and borrower if the loan is applied for before working drawings are developed.

Mr. Waid keeps in touch with the architect as his design progresses, making a few suggestions or criticisms, and occasionally requiring incorporation of features which he deems essential to the success of the building, which works for the best interest of both owner and lender. To facilitate this co-operation, Mr. Waid sends to the owner a "form letter" which varies with different kinds and grades of buildings. This form letter is in reality an outline specification and covers only important points which, experience shows, are frequently overlooked or else wrongly specified. It comprises seven pages containing a list of routine requirements which the designing architect can embody in his drawings and specifications; and, it may be remarked, he may easily secure a waiver or modification of any requirement if he has adequate reasons for so doing. It is not possible to give all the points of the form letter here, but a typical paragraph, showing the requirements in respect to window frames, may be quoted:

"Window frames shall be made tight with proper stops in brickwork and calked with oakum and pointed with Portland cement mortar under the outside staff bead, which bead shall be specified tacked on at the mill. Jamb lining or outside casing of all window frames shall project an inch into the brickwork, and care should be taken to see that the brickwork is built around this projection and not carried up with a straight jamb back of the projections. When, for any reason, such projecting member is wanting, frames shall be required to be anchored by means of a strap iron built into the brickwork. Window frames shall be carefully inspected as soon as delivered in order that defective sills, jambs, etc., may be rejected before the frames are set. All window sashes shall be equipped with approved metal weather strips."

In addition, specifications must be submitted to Mr. Waid covering the mechanical equipment and painting and plastering, and these details:

Surveyor's map, foundation work, details of door jambs and similar details including kalamein trim, details of fireproofing such as floor arches and column furring, shop drawings of fire escapes, complete plans of water piping showing locations and sizes of all hot and cold water piping, heating plans similarly complete and details of any vault lights.

Samples of certain materials must be passed on by Mr. Waid's office, among which are face brick, fireproof doors, corner beads, all hardware, elevator door hangers, marble and mosaic.

It will be seen from this that Mr. Waid, as the architect for the company, and working for the best interest of the borrower who pays his fee, keeps a firm hand on the preparation of all the details of design and construction. But even this does not complete the process. The inspection is carried into the field, extending to all the details of construction. The work is inspected at frequent intervals, as the needs require, sometimes as often as once or twice a week. Experience has proved that there are certain stages in the construction in which special inspection is required. Particularly important is the inspection of the bottoms of excavations before the footings go in, in order to make sure that the soil will carry the loads. It is surprising how often this principle is disregarded, and Mr. Waid accepts no excuse for not informing his office so that his inspector may see every trench and pier bottom. In one case where a contractor neglected to do this, Mr. Waid ordered a large footing in place to be blasted out, and found that the bottoms were insecure, thus amply justifying his action.

Mr. Waid's representative is also present when important tests, such as plumbing tests, are conducted. Experience has shown how necessary are the plumbing tests. A water test is required on all lines, including the soils, since defects in soil piping may permit the escape of gases in the building for an indefinite period. The smoke test has been found to be essential as the only way to detect defects not apparent on the surface. Furthermore, Mr. Waid will not accept even the official test of the local plumbing authority, because such tests sometimes turn out later to be faulty. All these steps requiring Mr. Waid's approval are necessary before the builder can obtain the installments on his building loans as they fall due. Advances are made by the Metropolitan Life Insurance Company on Mr. Waid's certificate in the same way that, ordi-

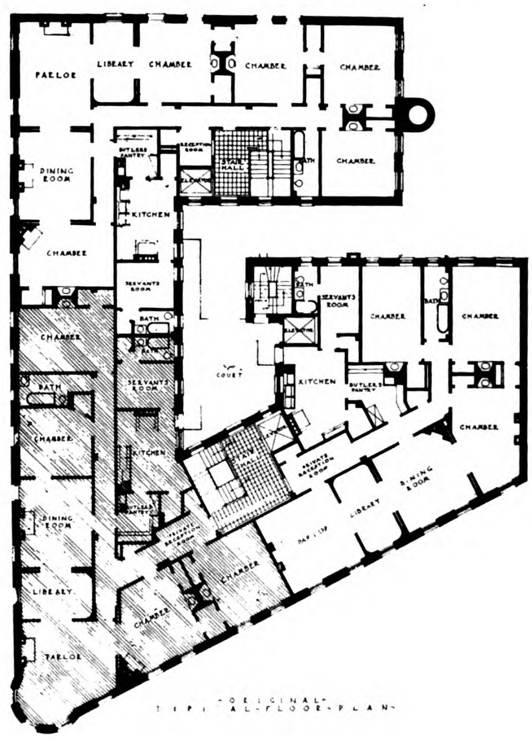
narily, the client's payments to a contractor are made on his architect's certificate.

In this system of passing upon loans Mr. Waid's relation to the architects employed by investors seeking loans deserves explanation. Always Mr. Waid encourages borrowers to avail themselves of complete architectural services in the usual way, for it is against his policy to furnish architectural services to borrowers. One may surmise that more than once builders have attempted to make use of Mr. Waid's services, seeking by this means to eliminate their own architects during construction. Mr. Waid's services are therefore in the nature of inspection or supervision. His form letter, already referred to, explains, in the very first paragraph, the whole situation:

"In connection with the loan which I understand is to be made by the Metropolitan Life Insurance Company, upon the above named property, I should be pleased to receive your assurance that the architect of your building has been retained to supervise the construction, since I do not in any way try to relieve him of his full professional responsibility in design and supervision."

Mr. Waid urges upon the investor the value of having an architect supervise construction, and in addition, on important work, of employing a clerk of the works. His relations with architects of the better type are very cordial, and it may well be understood that any reputable architect is only too glad to have an architect insisting, on behalf of the financial side, on high standards of construction. Not only that, but many speculative builders, through their experiences with Metropolitan loans, have come to realize the financial value of higher standards and, in more than one case, have taken pride in erecting better buildings.

Looked at in a broad light, financier, architect and public in any community together suffer losses if irresponsible real estate speculation prevails. The old-fashioned speculator built to sell immediately, and he cared little for either an efficient architectural plan or for durable construction. He could sell to investors who had no way of analyzing thoroughly the financial value of an architectural plan and who were inexperienced in deciding how far durable construction cuts down operating cost. But, even where the speculator may unload, the mortgage remains on the property, and also the bank's risk. A low percentage of mortgage is not always sufficient protection for a loan, since experience has shown that a poor building may lose its equity above the first mortgage in a surprising way, until foreclosure results. Hence, even if we selfishly ignore the interest of the owner of the equity, there is need for a thorough architectural inspection of design and construction by an experienced architect. If the practice of the Metropolitan Life Insurance Company proves anything, it is that services such as Mr. Waid's furnish the best safeguards for mortgages in which savings, insurance premiums and trust funds are invested.



Building at Broadway and 70th Street, New York, before Altering for "The Embassy"
William H. Gompert, Architect

The Embassy Hotel, New York

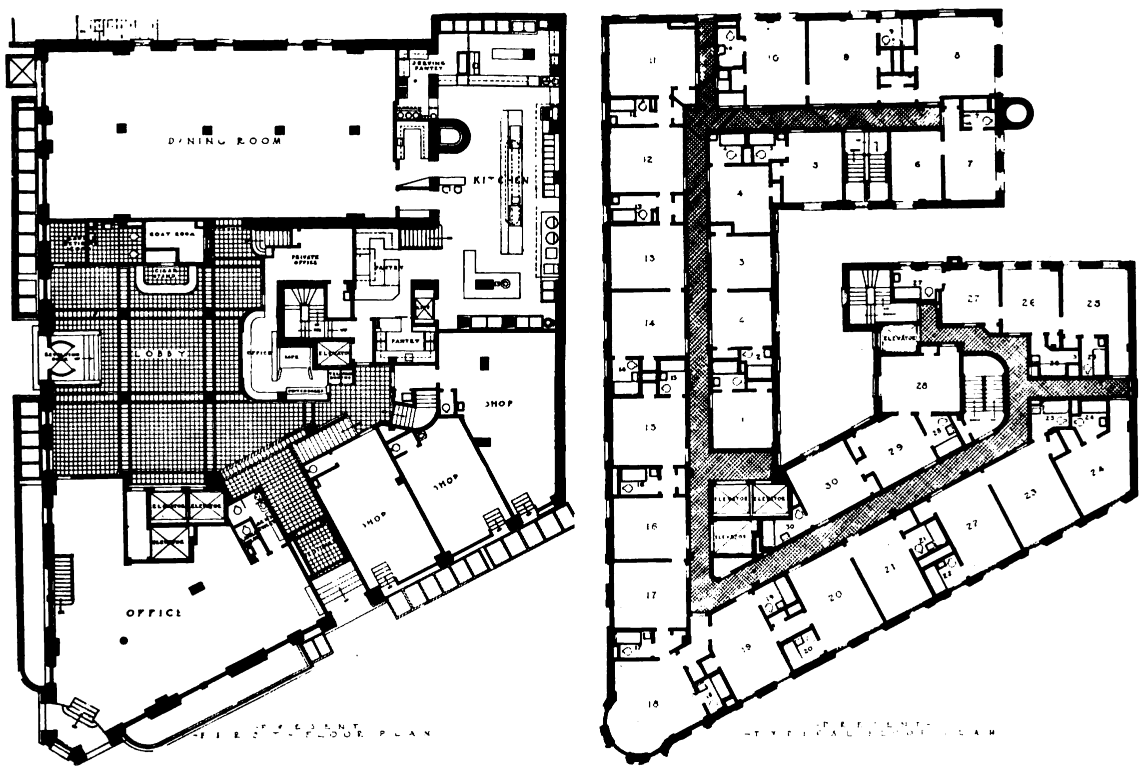
A SUCCESSFUL REMODELING OF AN OBSOLETE BUILDING

WILLIAM H. GOMPERT, ARCHITECT

WHILE a great wave of speculative building has been sweeping the country, and every possible encouragement has been given to the building industry by both legislative bodies and corporations controlling large public and semi-public funds, very little consideration or help has been given owners of old structures. If some form of tax-exemption were applied to rejuvenated old properties, and to further reward an owner if a successful alteration were made, changing the character of the occupancy from one type to another, it would often prevent serious depreciation of values in a locality and frequently completely alter the character of a neighborhood where deterioration has set in; it would further result in the renovation of dilapidated structures, thus tending toward a higher realty standard and making possible increased valuations for taxation purposes.

The great opportunities and possibilities which lie in altering a large, obsolete structure are exemplified in the Embassy Hotel at the southeast corner of Broadway and 70th street, New York. This is one of the largest reconstruction projects undertaken in New York in the last decade, and it is the first instance where a building has been altered from apartments to a hotel since the New York Building Code has required that an owner secure a certificate of occupancy when changing the character of tenancy from one type to another. The old structure was obsolete in type and was not producing a proper return on the investment, due to the fact that while the building when originally constructed about 22 years ago was the last word in apartment house planning, it had become so antiquated that a profitable rental could not be secured from the apartments. To overcome this condition it became necessary to radically alter the plan of the structure and give careful consideration to the utilization of space within the limits of the exterior walls, which could not be readily altered excepting at prohibitive expense.

Before the alterations were made the building was a continual source of worry and annoyance in an effort to keep the apartments occupied by desirable tenants and to meet the ever-increasing cost of maintenance and overhead expenses. From this condition the figures shown upon the balance sheet were immediately reversed, since the owner succeeded, before the alterations were completed, in renting the entire building on a long term lease and on a basis which gives an unusually profitable return on the entire investment.



Service and Room Layout Devised for the New Embassy Hotel

View of the Present Embassy Hotel
William H. Gompert, Architect

The size of the structure can be judged from the fact that the building covers an area of about 12,000 square feet. The original structure was 10 stories in height, to which two stories were added, making a 12-story hotel. The old building accommodated three families on a floor or a total of 30 families. The structure now contains 330 guest bedrooms and 275 baths. Careful attention was given the exterior architectural design which presented problems as unusual as those encountered in the planning, due to the reconstruction of the building. Before designing the two new stories the architect endeavored to find a face brick in the present market which would match in color and texture those used in the building 22 years ago, but since this was impossible he decided to adhere to the general renaissance motif, and the two new stories were designed and built of terra cotta so as to obviate the necessity of matching the old brickwork.

In approaching the problem as to the best method of effecting economy of area it was decided to eliminate all features which occupied an unusual amount of space, and therefore all mantels, fireplaces, recessed basins and sliding door partitions were entirely removed. To illustrate the attention given details several instances might be cited to show a more economical utilization of space. An elevator was removed which permitted the installation of two bedrooms, two bathrooms and two closets; by the removal of an old staircase and another elevator it became possible to plan two bedrooms, two bathrooms and two closets in almost the identical space. Economy of area was further effected by the removal of two old passenger elevators and installing three passenger elevators, grouped in a space which was not suitable for guest rooms. To summarize the results accomplished in converting lost space into income-producing areas, attention is directed to the fact that the old apartment building contained 27 rooms and 6 bathrooms per floor, whereas the hotel now contains 30 rooms per floor, with 25 baths. A commodious closet is provided for each room.

In many instances throughout the structure the result of the progress made in building construction in the last 22 years is evident; three high-speed passenger elevators have proved adequate for the occupants of 330 rooms in the 12-story hotel, whereas the two hydraulic elevators gave very poor and inadequate service when supplying only 30 families in the old 10-story structure. The old building was equipped with three boilers of antiquated type and an electrical generating plant. The boilers were so situated that a cramped condition existed which increased the operating expenses. In almost the identical space there are now located two modern, high-pressure boilers which perform full duty and not only supply steam heat for the building but also the steam power for the mechanical equipment of the hotel including kitchen, bakery, laundry, etc. The old electrical generating plant was entirely removed.

The pumping installation throughout the building is entirely new, excepting that it was found practical to use some of the old cast iron pipes, after burning out the sediment and corrosion. The bathrooms and toilets are ventilated mechanically by vertical ducts connecting with a main duct concealed in the hung ceiling space over the 12th story and with the exhaust vent located in the deck house on the roof. While the building is equipped with a sidewalk lift for the removal of ashes, in addition to this there is a pneumatic tube from the ash pit in front of the boilers to the sidewalk so that the ashes can be removed by pneumatic process.

The importance attached to this reconstruction project lies in the fact that it is a successful rehabilitation or rejuvenation of what was formerly a very sick and *passé* building, the result being secured at a very material saving, since a large part of the heavy structural portions of the edifice was retained as originally planned. Buildings erected 20 years ago or more were often of a quality which renders careful remodeling well worth while, and the economic value of a building when placed upon a profitable financial basis is apt to well justify the expenditure.

Memorial Town Halls in New England

By WILLIAM ROGER GREELEY

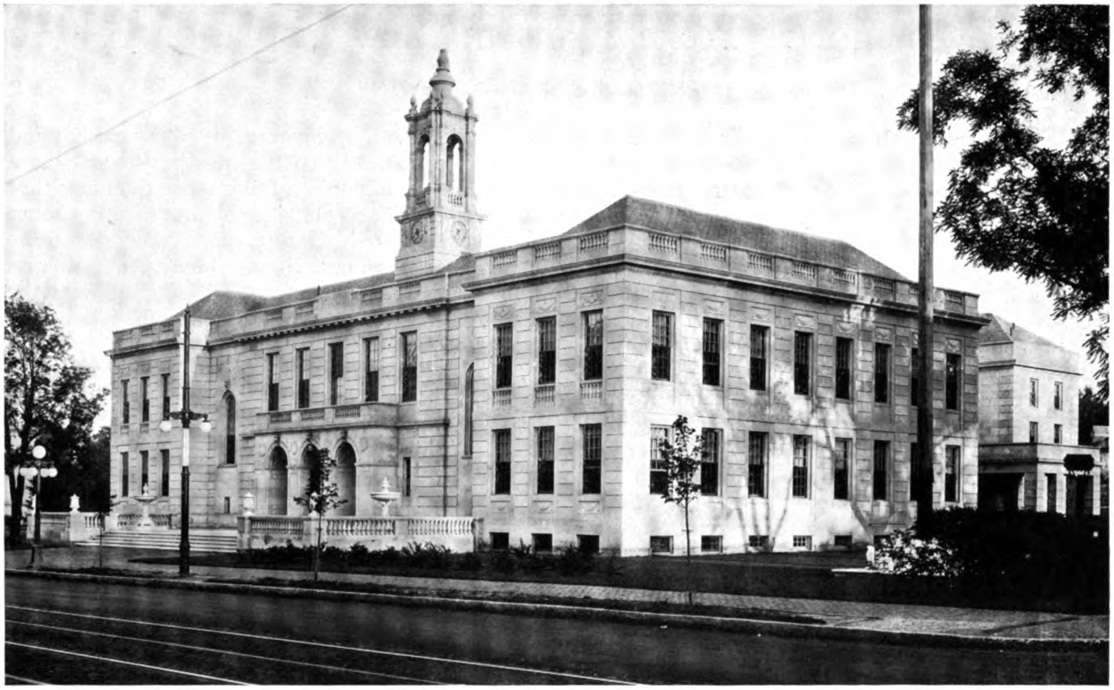
THE Bureau of Memorial Buildings of the War Camp Community Service issued a pamphlet some time ago dealing with community buildings as war memorials.

This idea of a community building is vague and idealistic, excepting perhaps in New England. The New England town has had from the very first just such a building, although it has never been called by that name. The New England communities were hardly settled before the freeholders got together and established a form of government which we think of as a simple democracy. They built themselves a meeting house to serve all the purposes of government, social life and religion. On week days they met in a single room to vote on political measures, including the purchase of land for the town common or commons and of a wood lot for the use of the settled minister. They elected fence viewers to settle lot-line disputes, field drivers to gather together stray cattle, and pound keepers to watch over the cattle in the pound until the owners claimed them. On Sunday in the same room they gathered, morning and afternoon, to listen to their minister. The government of the church and town were one, and so the meeting house was a community building in a fuller sense than any that we have had since. Outside the first meeting house there was a row of hitching posts, as the voters came on horseback, owing to impassable roads. Later on a row of horse sheds was added. Such was the simple equipment of the early community building.

Many of the New England towns today are forced by the universal suffrage to give up the simple democracy and have recourse to a limited or representative town meeting. This reduces the number of voters without changing the form of the meeting or the conduct of town affairs, and makes it possible to house under one roof all those who are to participate in the meeting. The town hall of today, instead of having the one room of the early settlers, must satisfy a long list of departments and requirements. Among these may be mentioned:

1. The hall. This is for meetings, for elections and for many non-political uses, among which are theatrical and moving picture entertainments, dances, celebrations, lectures, concerts, etc.

Hearing Room, Town Hall, Arlington, Mass.
R. Clipston Sturgis, Architect

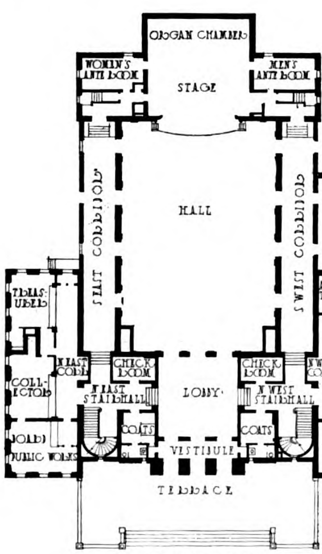


General View of Town Hall, Arlington, Mass.
R. Clipston Sturgis, Architect

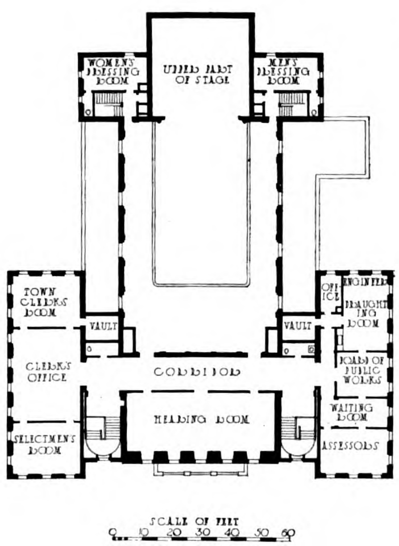
2. The town office. This general office is usually occupied by the town clerk and his assistants, if he has any.

3. The selectmen's office. This may be made large enough to serve as a small committee or hearing room. It must have a vault for records.

4. Office of the treasurer, auditor and accountant. These officers have charge of the town finances and must have a vault.



First Floor Plan



Second Floor Plan

Town Hall, Arlington, Mass.

5. An office for the collector and assessors, with vault.

6. An office for the board of public works, which has charge of the water, sewer and road departments and other minor engineering work, such as small bridges and culverts.

7. An office for the town engineer and his draftsmen, if any.

8. Sealer of weights and measures. This officer must have some small equipment, although his work is largely done outside.

9. Quarters for inspectors. Various inspectors require only desk room, and all of them can occupy one large office. They include inspectors of buildings, plumbing, wiring, slaughtering, meat and provisions and milk.

10. The board of health. This board requires an office, and should have in any large community a small laboratory for biological and bacteriological analysis.

11. Cemetery commission.

12. School department, although this department

is often provided for in one of the school buildings.

13. Fire department. The activities of this department are also frequently taken care of in one of the buildings belonging to it.

14. Police department and lockup. In large communities this department has its own building; otherwise a lockup is sufficient, and may be placed in the basement of the town hall.

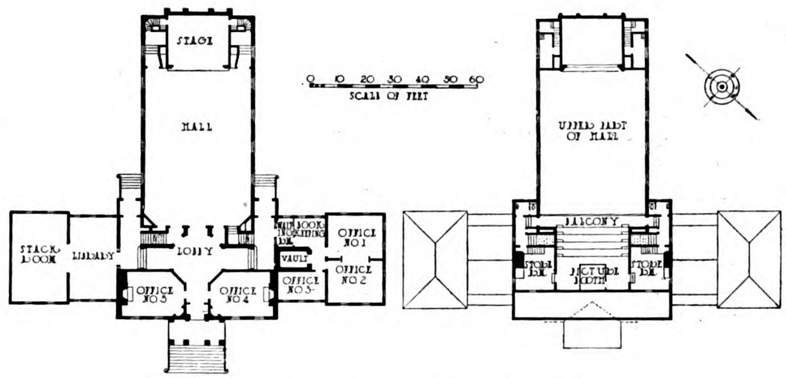
15. The park department.

16. The planning board. This board and members of the park department can meet in a committee room, as they need no separate quarters.

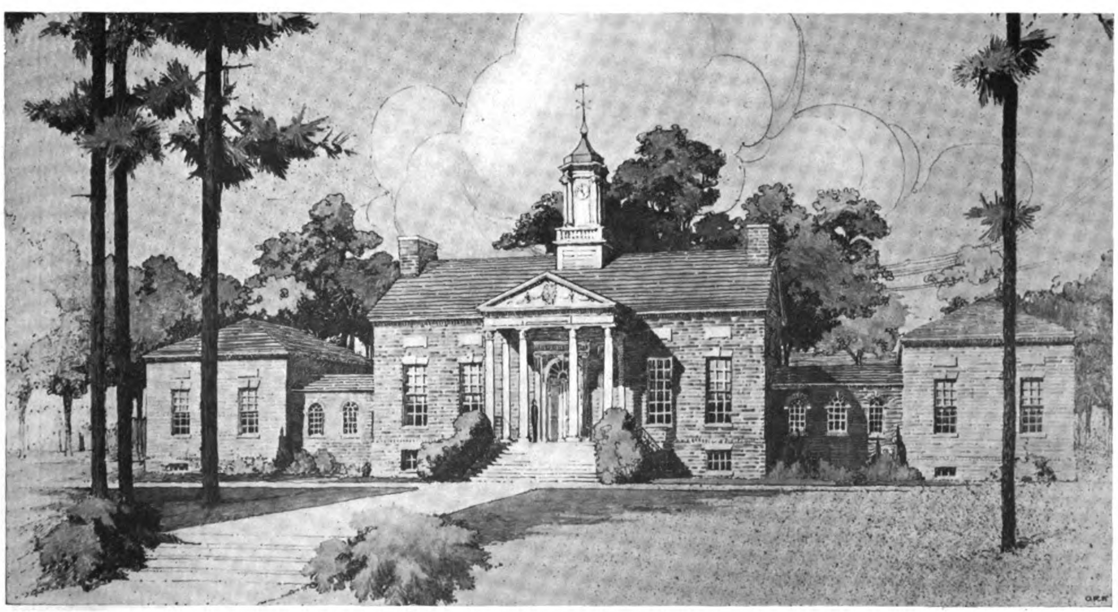
Added to all these departments, which are strictly administrative, are usually a number of facilities for social uses. Chief among these is a banquet or supper room with a kitchen and pantry. Often also a room is set apart to serve as a public library. This use may be temporary, pending the time when the library shall have grown so as to need a separate building. By that time the room in the town hall originally used for housing the library will be needed for some new town department.

The present standards controlling the design and construction of town halls are much higher than they used to be, and this has a very direct effect upon the character of the building. Up to 15 years ago the hall was usually on the second floor with the offices and smaller rooms underneath. Today such an arrangement would be regarded as quite unsatisfactory compared to the plan in which the hall is on the first floor. The increased number of voters in most towns makes it very important that the hall shall be provided with adequate exits near the ground. This fact affects the ground plan of the town hall fundamentally. Furthermore, a hall approached by a broad flight of steps and entered at the first floor level is much more dignified and impressive than one reached only by interior staircases. The hall cannot have offices built over it, as this is uneconomical; therefore the offices must be in the basement underneath the hall or in a wing or wings on the same level. In the plans shown of the Tewksbury and Dover Town Halls the wings are a single story in height. In the Arlington Town Hall the plan is similar in arrangement but the wings are two stories high.

The requirements of the smaller towns at the



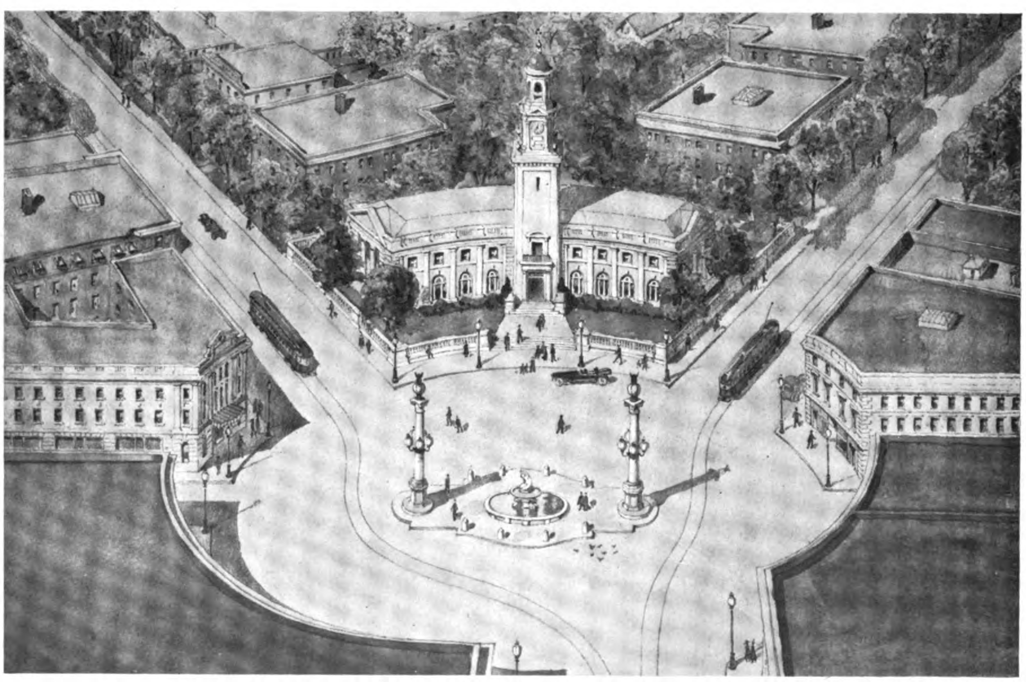
First and Second Floor Plans, Dover Town Hall



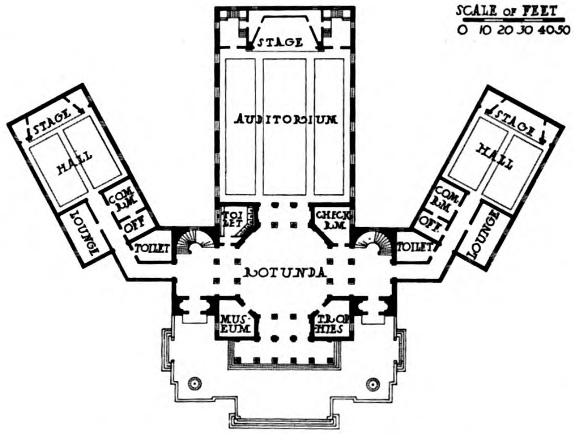
Sketch for Town Hall at Dover, Mass.
Kilham, Hopkins & Greeley, Architects

Proposed Memorial City Hall for Attleboro, Mass.
Kilham, Hopkins & Greeley, Architects

present time are shown in both the Tewksbury and Dover plans, which may be regarded as typical as far as the accommodation which they provide is concerned. They contain halls with stages and galleries, general offices with two private offices each, one for the selectmen and similar boards and committees and the other for the assessors and officials dealing with finances. Each has also a room for use as a public library, one or more committee rooms, a banquet hall and a kitchen, together with such minor items as a small room for the sealer of weights and measures, a lockup and storage space. This provides for a community of 2,000 or 3,000 population. The Arlington Town Hall serves a community of 15,000 to 20,000. When the population exceeds this latter figure the limited or



Scheme for a Town Square at Framingham, Mass.
Charles M. Baker, Architect

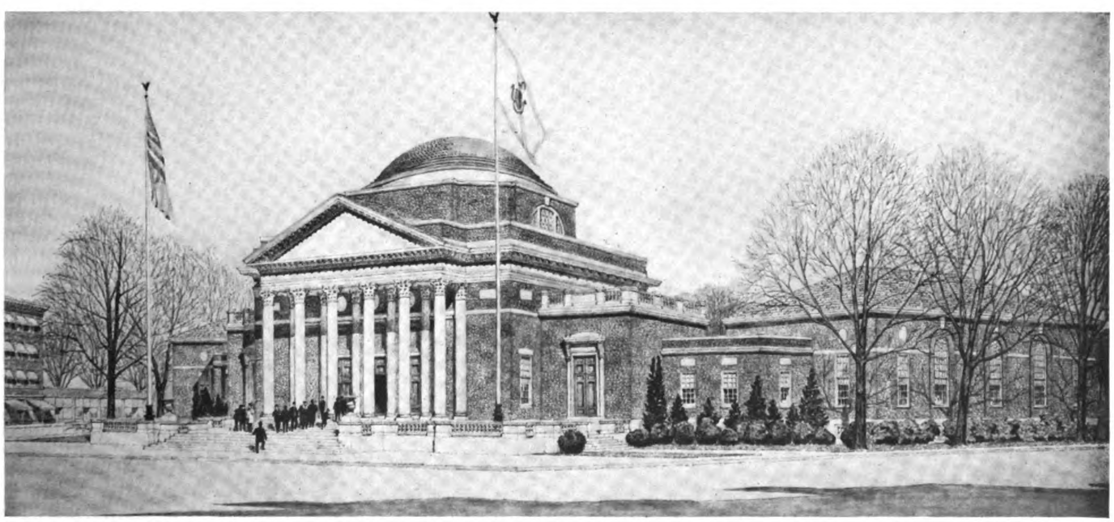


Main Floor Plan for Proposed Memorial Building
Framingham, Mass.

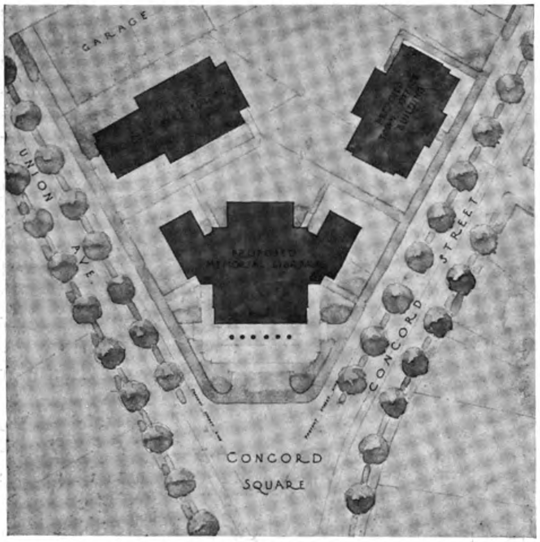
representative form of government becomes necessary, and the capacity of the hall need not, therefore, be increased. So much for the practical side of the town hall.

Much has been said as to the desirability and propriety of making such a building a memorial to the men who participated in the great war. It has been argued that such a memorial may combine beauty with utility, and that it is usually of a size that will add appreciably to the character of the village center where it may be built. All this is true. Architecture is one of the fine arts, and if the memorial hall is good architecturally the memorial is highly successful and is a credit and honor to those whom it commemorates. Of course it may not be of good architecture, but the same risk exists in the field of sculpture or painting. A monument may not be monumental or even tolerable in appearance. The commemorative painting may be very fine or very disappointing. A work of art which is not successful is a very great burden for any community to carry. Nevertheless, it is through some form of art that we must seek to express our ideals and emotions, and when a town decides to erect a memorial the important task is to choose the best artist available for the type of memorial desired, whether it be sculpture, painting or architecture. The easiest mistake, especially for a well-to-do American community, is to build the memorial too large at the sacrifice of scale and material. The building should dominate but not overpower its surroundings, and it should be of permanent construction and of the handsomest materials available. A small building of granite may be a very much nobler memorial than a large building of humbler material.

The material most common in New England for use in public buildings is common red brick trimmed with white marble or other stone. This is adapted to buildings in the colonial and Georgian styles and is usually in harmony with the surroundings that the building is likely to have in a New England village. In the larger towns and cities buff limestone, freestone or even marble is frequently used. The Arlington Town Hall is entirely of Indiana limestone, while the public library nearby is in Ohio freestone. The two materials appear very well together. Another stone frequently used, particularly suited to the New England climate, is granite. This stone lends itself not only to the colonial treatment but to the Greek, Roman or renaissance architectural styles. University Hall, by Bulfinch, in the Harvard yard is an example of the beautiful use of granite in a small scaled colonial facade. Another building by this early New England architect, the Massachusetts General Hospital in Boston, shows granite treated in a



Perspective of Proposed Memorial Building at Framingham, Mass.
Charles M. Baker, Architect



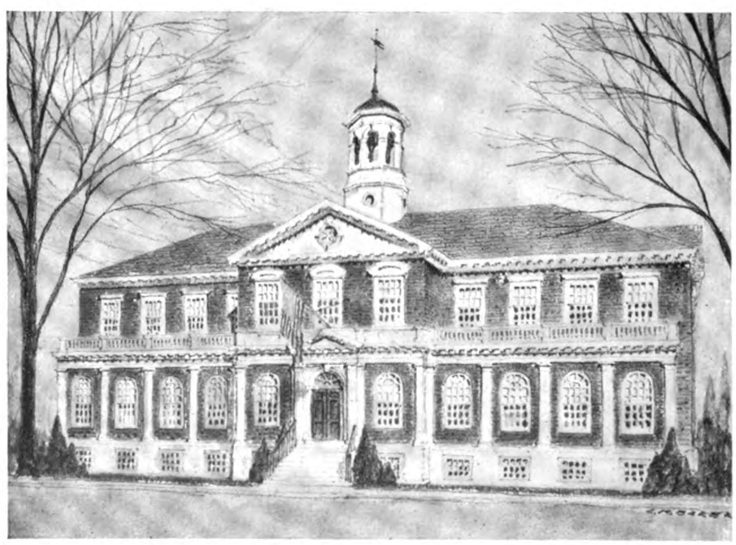
Alternative Scheme for Square, Framingham, Mass.
Charles M. Baker, Architect

different style bordering on the impressiveness of the Roman, but with excellent results. The early use of granite was generally restricted to styles in which ornament was not essential. In some cases carved ornament was supplied by marble panels, for example. Enlarged facilities today, however, make carving in granite comparatively as simple as in the softer stones.

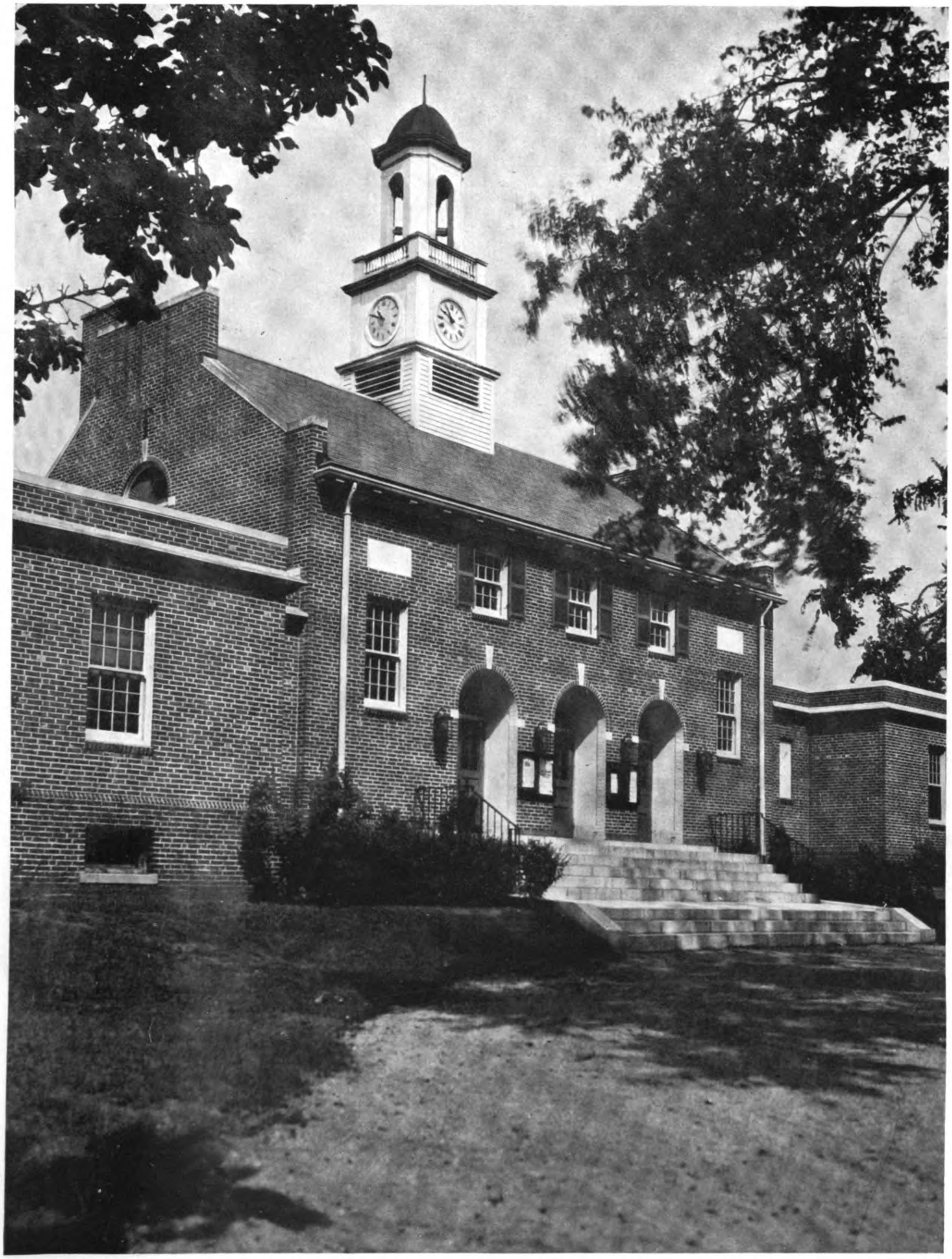
The memorial character is secured by the qualities already enumerated. Beauty alone will not make the building a memorial. Bad scale will mar it. Cheap or temporary materials will ruin it. Impropriety of design will spoil it. A memorial town hall designed like an ordinary office building is lacking in memorial quality. On the other hand it is just as bad to have it look like a state capitol.

In the usual town hall display must be avoided and every effort made to preserve a dignified simplicity. Tradition should dictate the style used, particularly in a locality which possesses noble traditions, for in commemorating its heroes who went out from the town the community will want to build a monument which reflects their characters, homes and haunts. Old Deerfield, Massachusetts, is steeped in the traditions of the Indians and early settlers. The style of its memorial should be in harmony with such a tradition; Ashtabula and Gary should build in a different style, St. Augustine in another, San Diego in still another, and New Orleans in a style wholly different. Arlington, Massachusetts, is a town with some revolutionary traditions, but now a large and thriving residential suburb of Boston. The style of its town hall well expresses this particular community. The Dover and Tewksbury Town Halls are located in remoter suburbs, having the character of small, open villages, with farms and country residences. Both towns have only general colonial traditions. The Attleboro City Hall is again different in style. Attleboro is a small city, almost entirely devoted to the manufacture of jewelry. The city hall is very delicate in its detail, and is of fine material, either white marble or light colored stone, richly carved. The proposed memorial at Framingham is monumental in scheme, but in its modest materials entirely fitting.

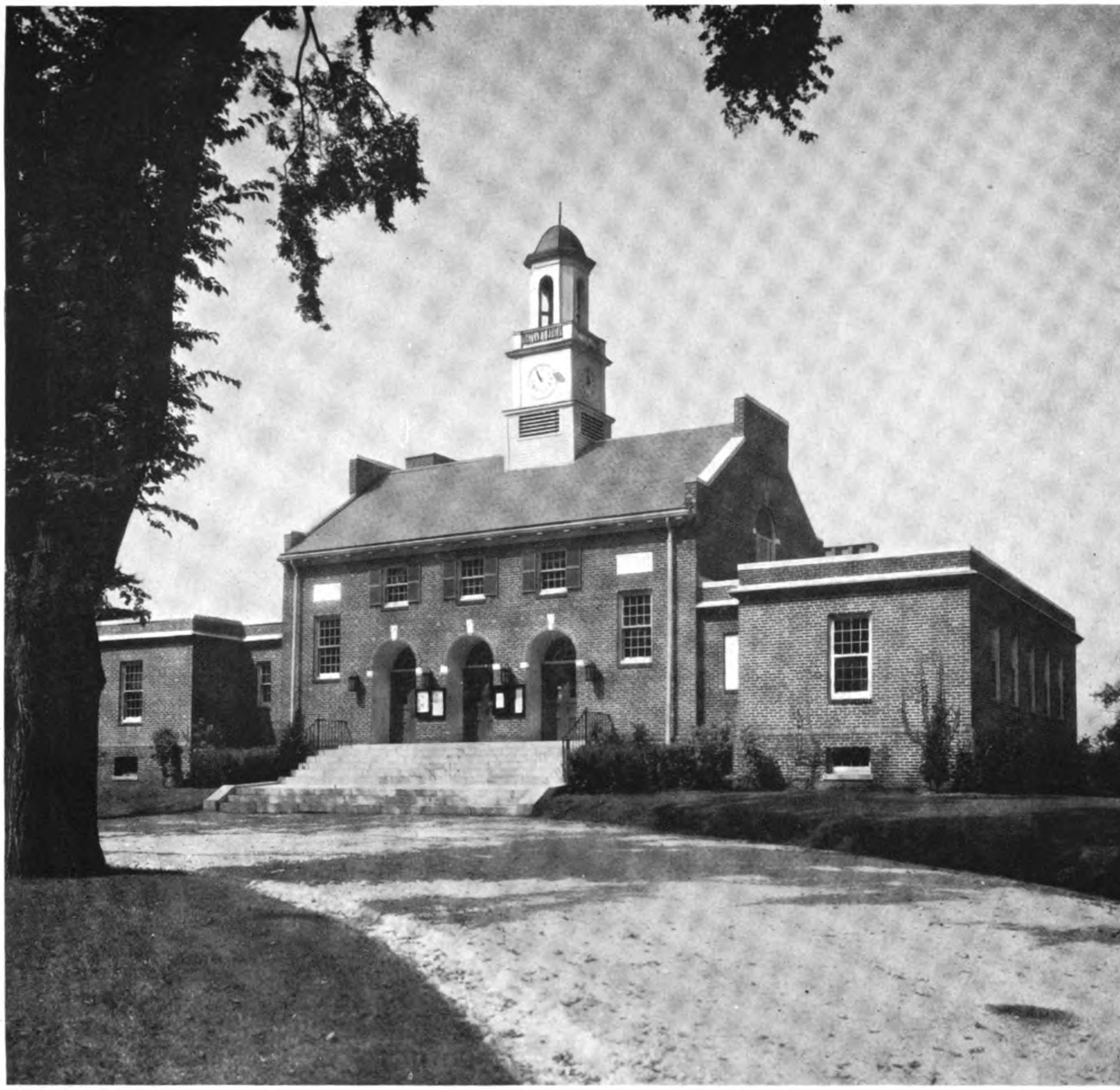
The town hall is generally among the more important buildings of a place; quite often it is the most important structure in the town, and it is necessary that it be given a dignity which shall make it in keeping. Such a building is rarely without surrounding grounds of some extent, and this adds to the importance of its treatment since it becomes practically a civic center. Moreover, a town hall is expected to be a structure permanent and lasting, built to function as long as the town itself endures, which, particularly where it is developed as a memorial, should stir the architect to the exertion of his utmost efforts in the matter of design, plan and the wisest choice of materials. Properly designed, the town hall will prove a lasting testimonial to the skill of its architect; no less so, perhaps, than a memorial to those whose sacrifices are commemorated therein. With due consideration in each individual case of these factors of propriety, scale and style, a large percentage of the memorial town and city halls that will inevitably be built may be worthy of their communities.

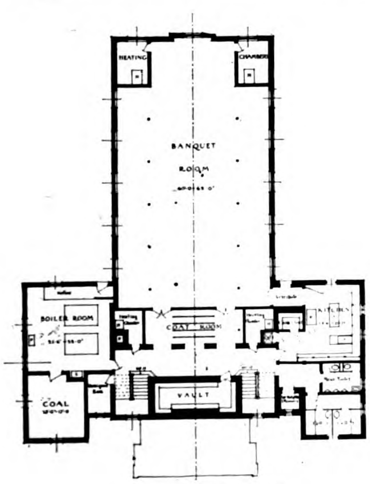


Proposed Town Hall, Framingham, Mass.
Charles M. Baker, Architect

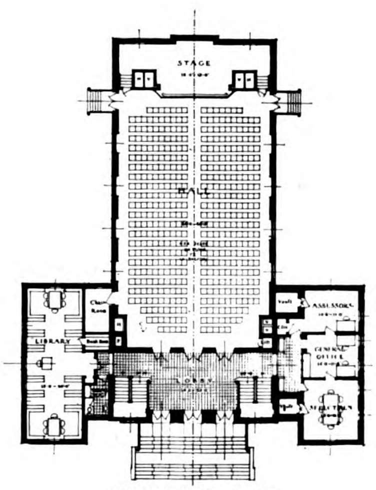


DETAIL VIEW FROM APPROACH, TOWN HALL, TEWKSBURY, MASS.
KILHAM, HOPKINS & GREELEY, ARCHITECTS

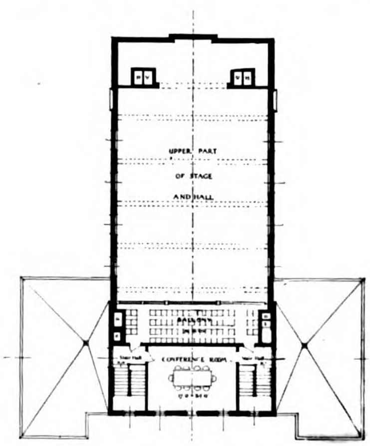




BASEMENT PLAN



FIRST FLOOR PLAN

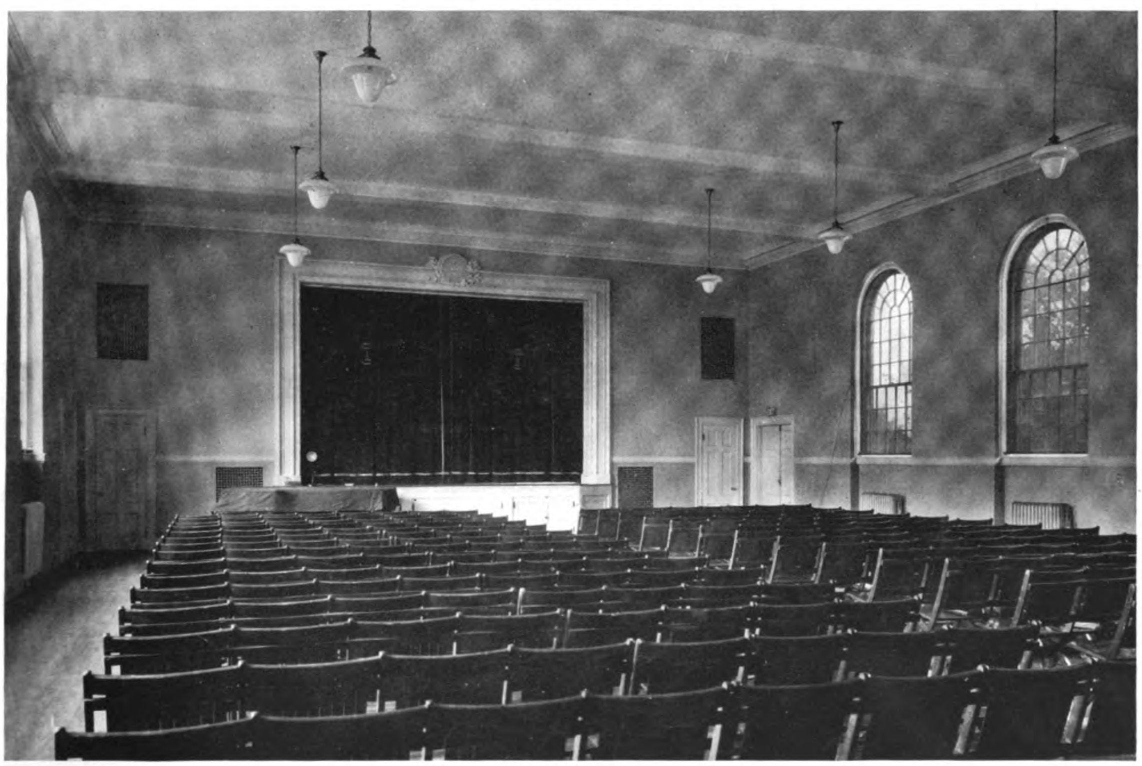


SECOND FLOOR PLAN

TOWN HALL, TEWKSBURY, MASS.

KILHAM, HOPKINS & GREELEY, ARCHITECTS

ENTRANCE LOBBY LOOKING TOWARDS OFFICES

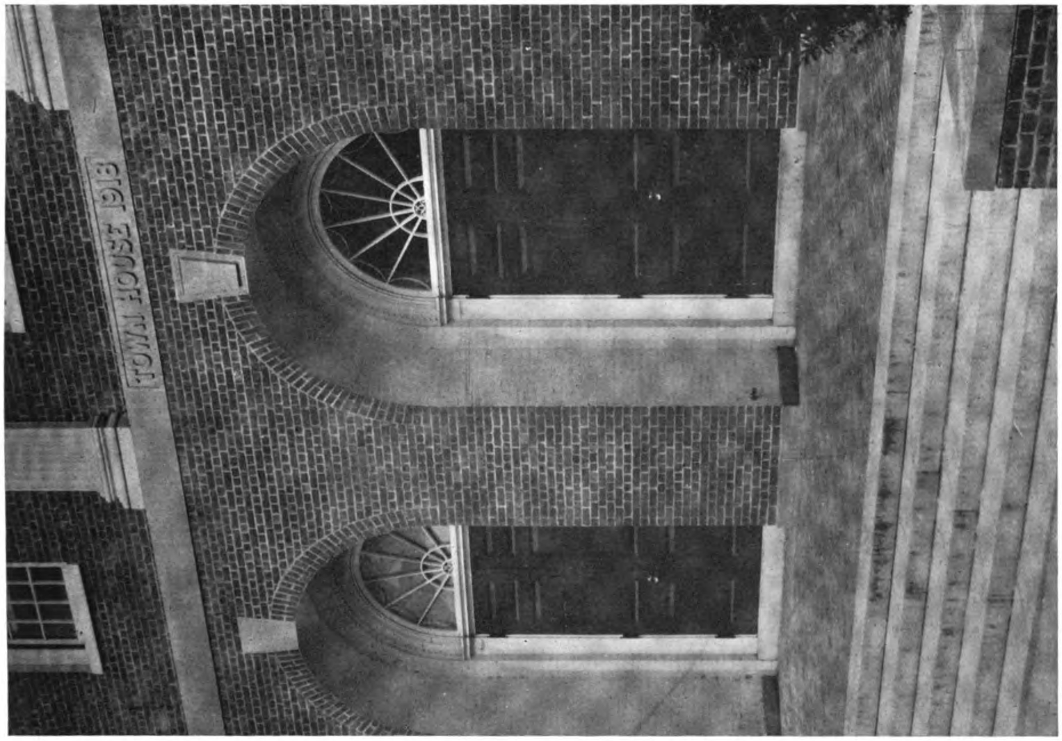


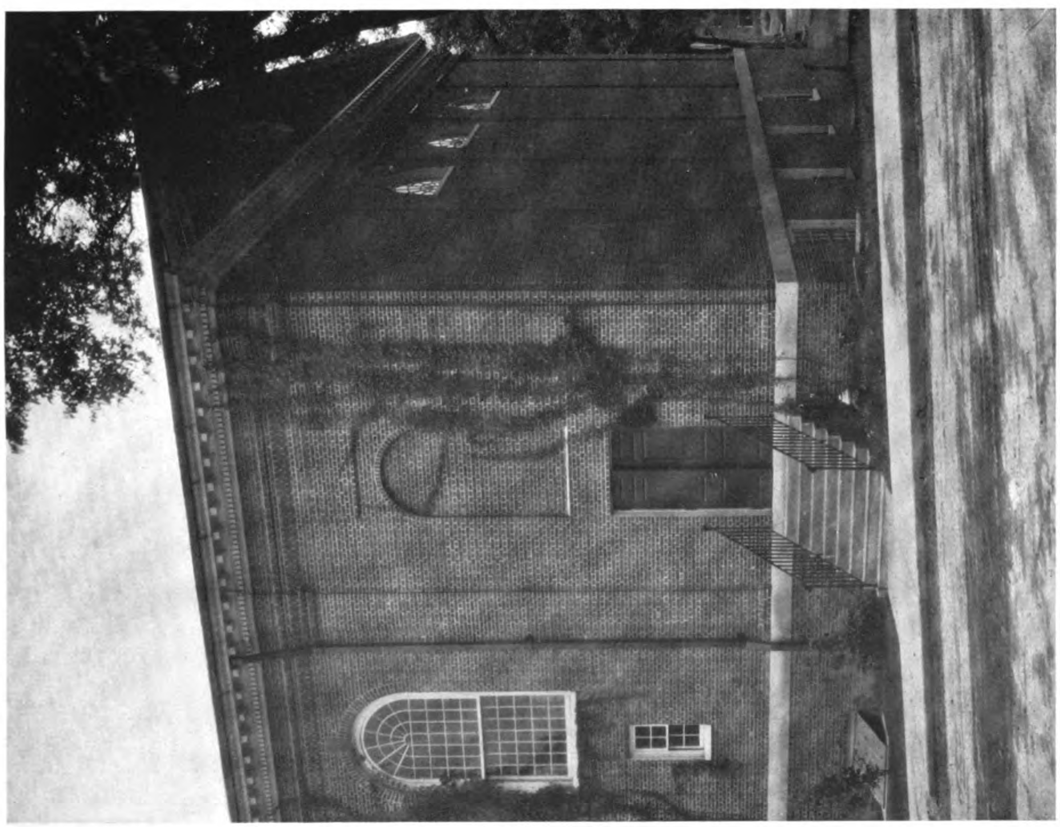
ASSEMBLY HALL

TOWN HALL, TEWKSBURY, MASS.

KILHAM, HOPKINS & GREELEY, ARCHITECTS

TOWN HOUSE, PETERBOROUGH, N. H.
LITTLE & RUSSELL, ARCHITECTS



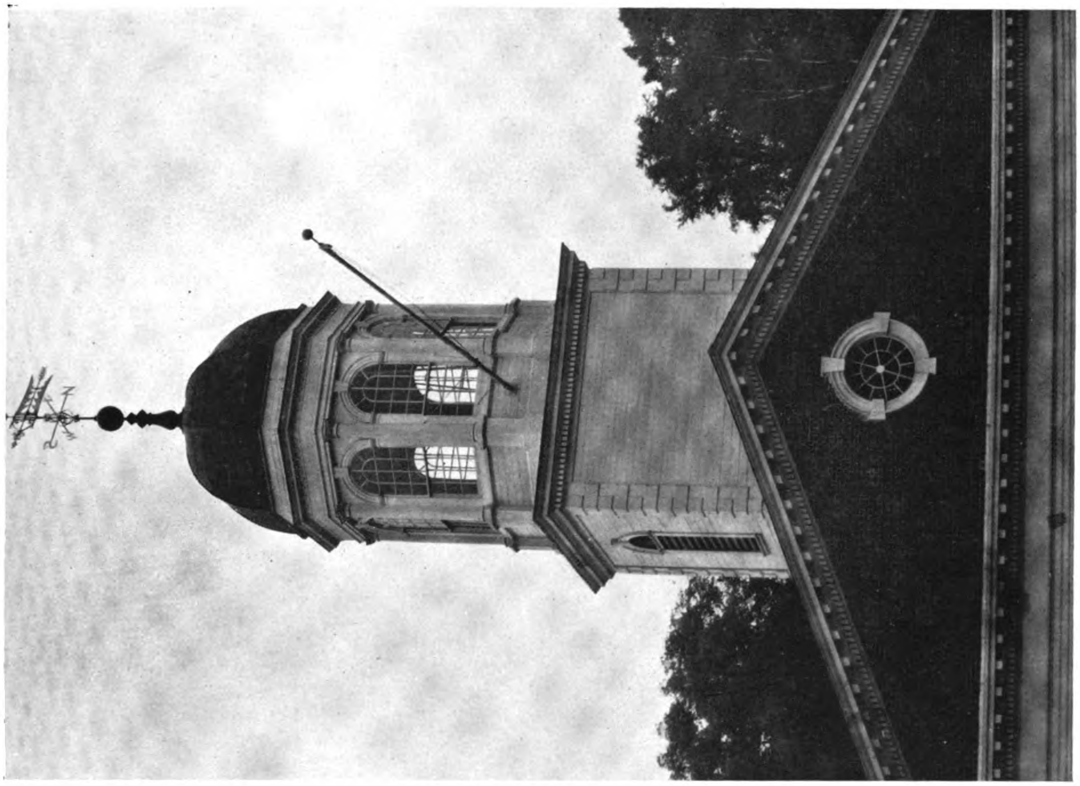


DETAILS OF FRONT AND SIDE FACADES

TOWN HOUSE, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

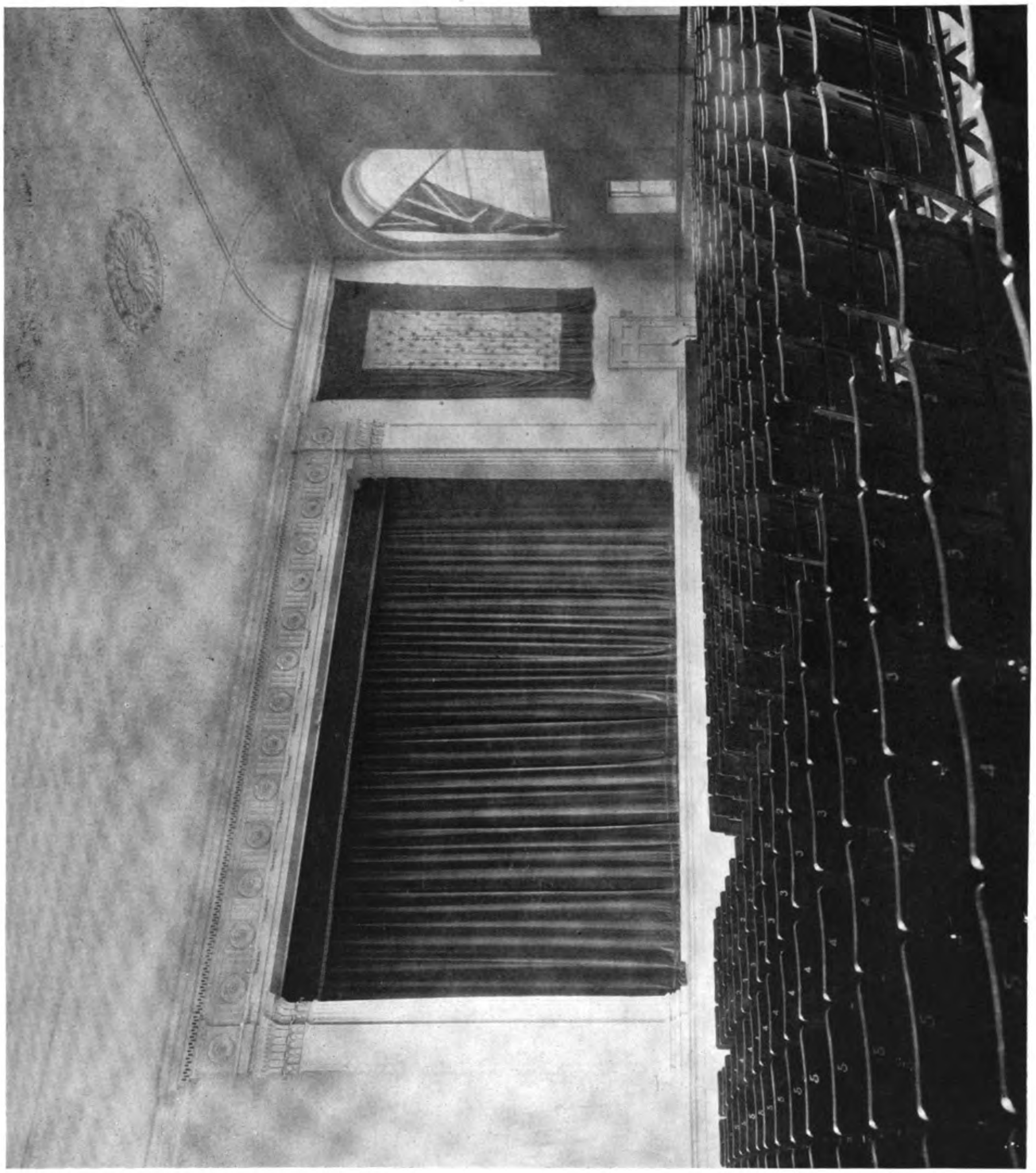
DETAIL OF STAIR HALL



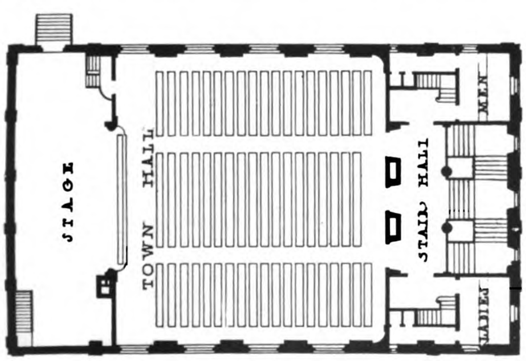
DETAIL OF LANTERN

TOWN HOUSE, PETERBOROUGH, N. H.

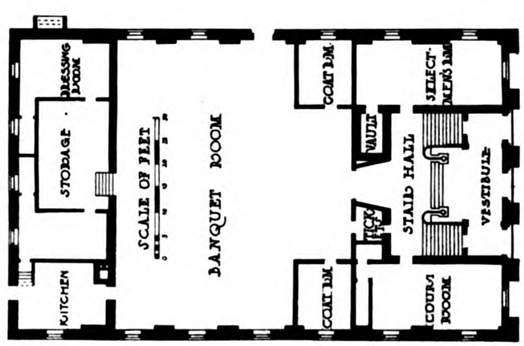
LITTLE & RUSSELL, ARCHITECTS



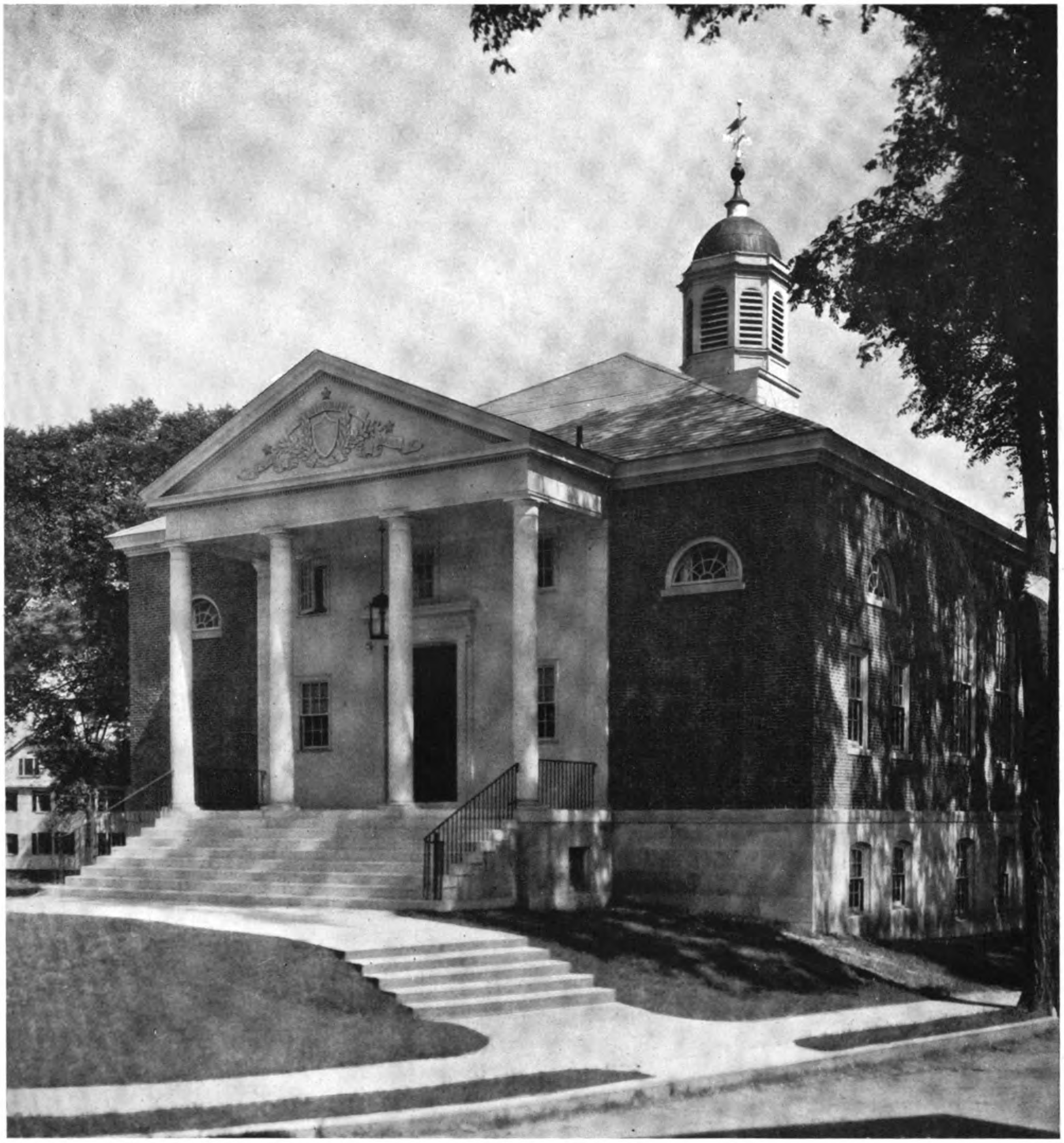
ASSEMBLY HALL
TOWN HOUSE, PETERBOROUGH, N. H.
LITTLE & RUSSELL, ARCHITECTS

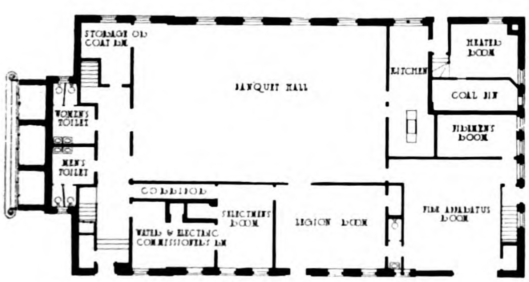


SECOND FLOOR PLAN

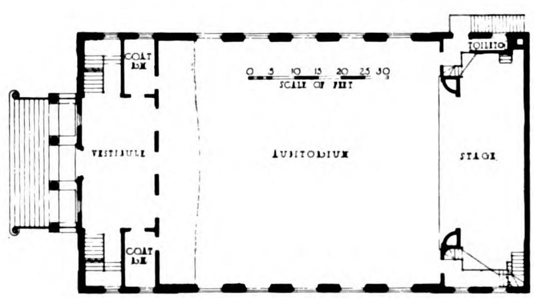


FIRST FLOOR PLAN





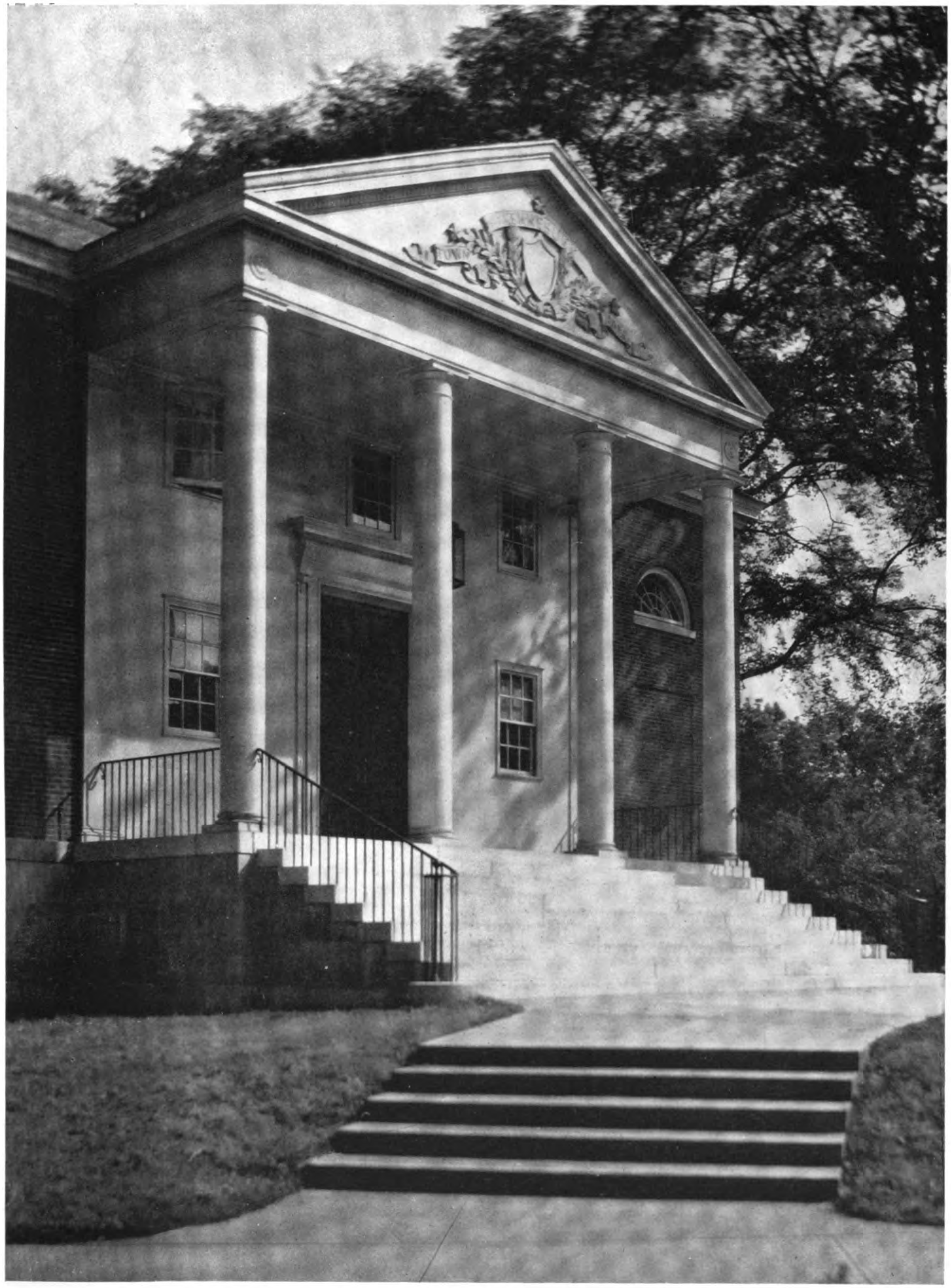
BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

TOWN HALL, KENNEBUNK, MAINE

J. D. LELAND & COMPANY, ARCHITECTS



DETAIL OF ENTRANCE PORTICO

TOWN HALL, KENNEBUNK, MAINE

J. D. LELAND & COMPANY, ARCHITECTS

Villas of the Veneto

By HAROLD DONALDSON EBERLEIN AND ROBERT B. C. M. CARRERE

VI. MALCONTENTA (VILLA FOSCARI), NEAR GAMBARARE, CANALE DI BRENTA

"NOT very far from the *Gambarare*, on the *Brenta*, is the following fabrics, belonging to the magnificent Signors Nicolo' and Luigi de Foscari. This fabric is raised eleven foot from the ground; and underneath are the kitchens, servants' halls, and such like places, and vaulted rooms above as well as below. The height of the vaults of the greater rooms is according to the first manner for the height of vaults. (Book I, Chapters 23 and 24.) The square rooms have their vaults *a cupola*. Over the small rooms there are *mezzati*. The vault of the hall is crossed semicircularly; the height of its impost is as high as the hall is broad; which has been adorned with most excellent paintings, by Messer Battista Venetiano. Messer Battista Franco, a very great designer of our times, had begun to paint one of the great rooms; but being overtaken by death, has left the work imperfect. The loggia is one of the Ionic order. The cornice goes round the house, and forms a frontispiece over the loggia; and on the opposite part below the main roof there is another cornice, which passes over the frontispiece. The rooms above are like *mezzati*, by reason of their lowness."

View of Principal Front from Distance

THUS have we Palladio's own description of Malcontenta, published in his *Quattro Libri dell' Architettura* in 1570. It is not necessary at this point to enter into a detailed story of Malcontenta, which, by the way, is full of interest if one chooses to pursue it. A bare outline, along with some comment on the vicissitudes through which it has passed, its present condition, and the nature of the site, will serve our purposes for the time being.

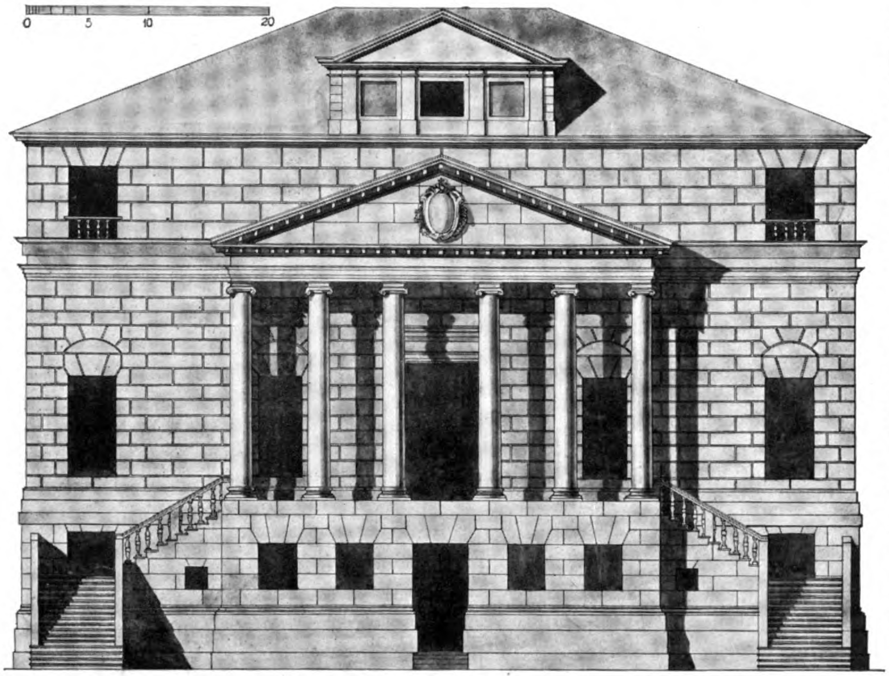
The exact year in which the villa was built seems to be shrouded in some uncertainty. At any rate there is ample evidence to show that it was erected at an early date. Tommaso Temanza, in his eighteenth century biography of Palladio, says that because of "this beautiful invention of his" at Malcontenta "Andrea's name began to resound also in Venice," and that the fame thus noised about brought him the important commissions he subsequently executed within the city itself. His statement apparently is not lacking in accuracy.[1] Geographically, Malcontenta is the first outpost—chronologically it is one of the earliest, if not indeed the very earliest—in that long chain of villas with which the Venetian nobles in close succeeding years lined the banks of the Canale di Brenta, an expansion of Venetian life already reviewed in previous papers, which reached the culmination of its splendors in the Palazzo Pisani at Strà in the eighteenth century.[2]

The name "Malcontenta," so the legend has it, was bestowed in allusion to a "fair but frail lady of the family, who was sentenced by her kinsfolk to do penance there." Happier memories are those of the sumptuous festivals of which this villa was the scene. One of the most famous of these was in 1574, when the Foscari entertained King Henry III of France. After a magnificent luncheon at Malcontenta, the sovereign took boat, the proper mode of progress on the Brenta, and passed up the stream "in amazement at its splendid villas, amongst which the house of the Procurator Federigo Contarini particularly caught the royal regard." We may well believe that the Foscari, in whose palazzo in Venice the distinguished guest of the republic had been domiciled, would not allow the magnificence of his entertainment in their country house to fall short by comparison, and even now, after more than three centuries, we seem still to catch the distant glint of all this brave parade, from the inventory of fitments provided against Henry's visit, when we read among the items for the king's gondolas: "felse[3] of scarlet satin, 156 ducats; a boat's carpet of violet Alexandria velvet; a felse of the same velvet lined with silk, 55 ducats; another velvet carpet of the same color, two canopies, one of violet satin fringed and embroidered with gold, the other of white satin, and two cushions of scarlet satin and gold." The mind's eye is dazzled till it fairly aches on reading the rest of the inventory of gorgeous appointments which the state provided to adorn Henry's lodgings in Venice, every item duly accounted by measure and cost. Whatever gala decorations the Foscari themselves may have devised to mark the king's

[1] The four important commissions referred to in Venice were the Conventa della Carita, the facade of San Francesco della Vigna, San Giorgio Maggiore and Il Redentore.

[2] Now known generally as the Villa Reale.

[3] The canopied or cabin-like covering over the rear seats of a gondola.



Elevation of Principal Facade

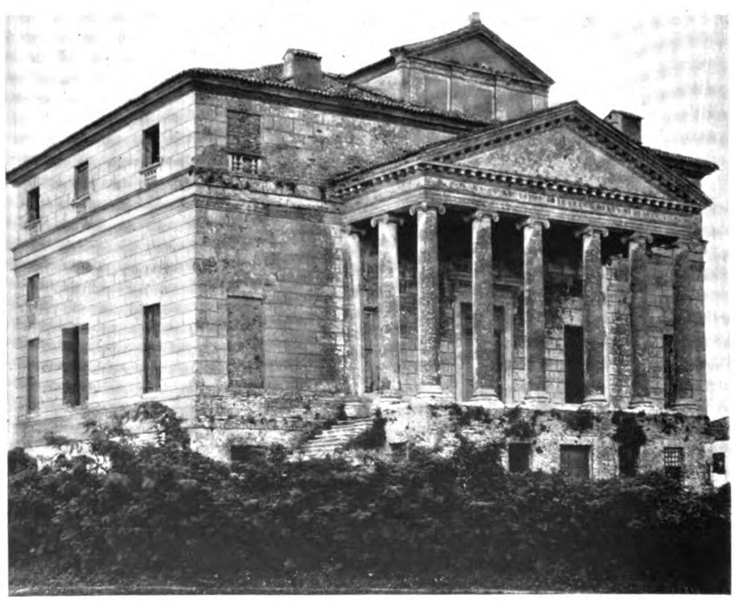
the apparently advanced stage of dilapidation is in reality scarcely more than superficial, and it is gratifying to know that its present possessor, the Count Minerbi, has already taken steps for its restoration.

The site in itself could never have offered much attraction save that of its proximity to Venice, its position on the Canale di Brenta, and ease of access by barge or gondola. The country in all directions is as flat as a table, and there are but few trees to break the barren monotony, while on all sides are the fens intersected by canals.

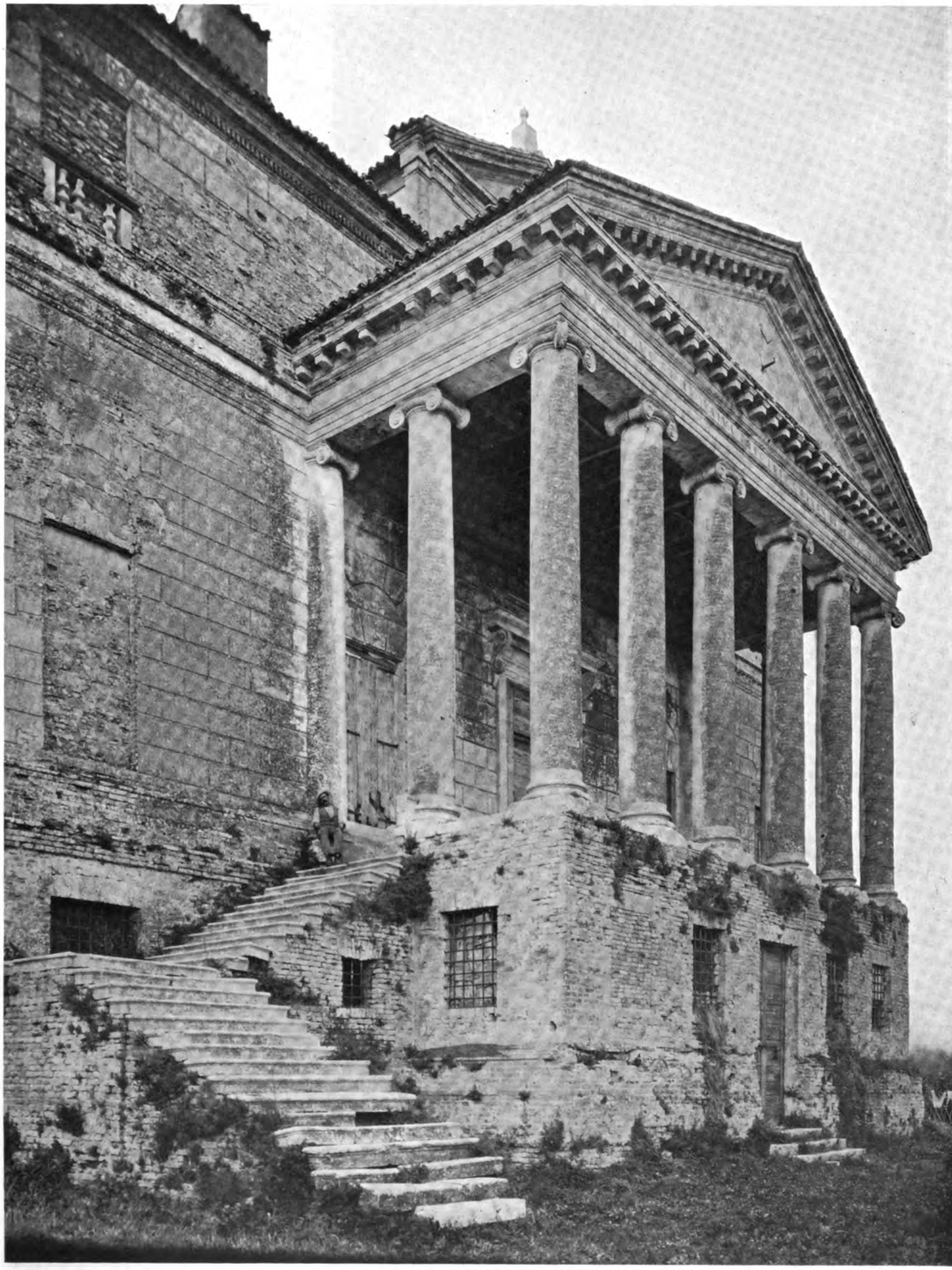
visit to Malcontenta, there is no doubt that the villa itself afforded a worthy and regal setting for all the incident wealth of color.

The present state of the house and its immediate surroundings quite justify the melancholy name of the villa, as one may easily see from the illustrations. The gaunt, half ruinous pile is but a sorry ghost of its former self—one flight of steps leading up to the loggia quite gone, the other flight broken and bereft of its balustrade; the basement used as a storage place for farm implements and vehicles; the great cruciform *sala* of the main floor, and some of the smaller rooms likewise, doing service as granaries with all the floors piled high with heaps of corn, as the pictures show; the great chambers filled with lumber of all sorts; the windows either boarded up or unglazed, with the appearance of the sockets of sightless eyes; and over all a general air of depressing desolation. And yet, despite the mournful aspect of decay, the fabric retains an air of indomitable nobility so convincing that one is profoundly impressed with its inherent greatness. Fortunately, the structure is so substantial that

Altogether subordinated for years to farming interests and the dictates of purely utilitarian expediency, the natural nakedness of the environment is all too plainly revealed in the recent photographic records. It is kinder and fairer to judge of Malcontenta's possibilities of beauty, through the aid

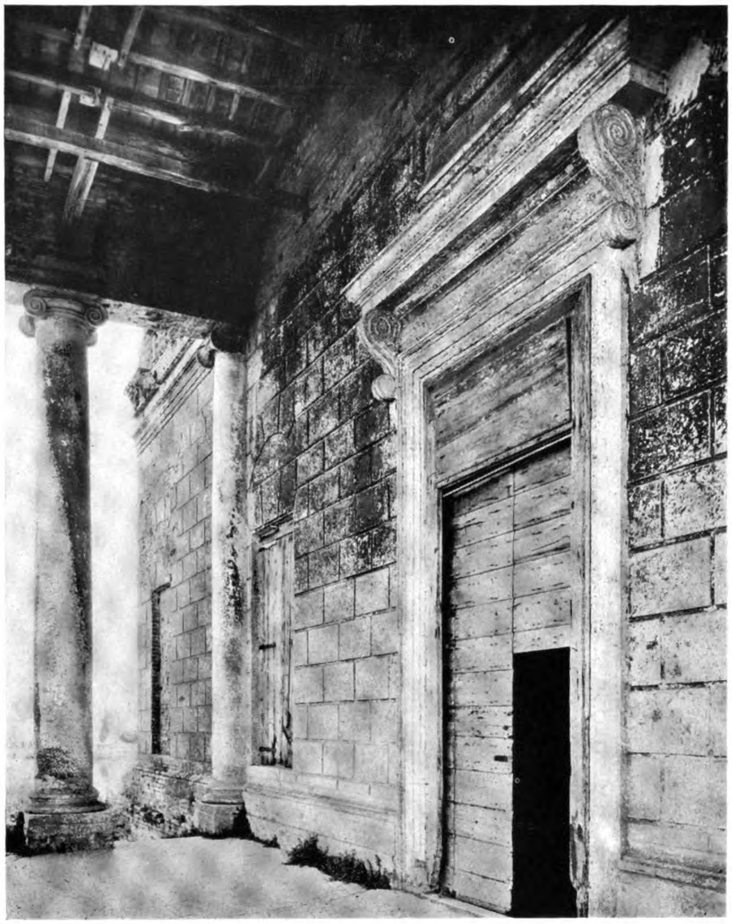


Present-day View of North Front of Malcontenta



DETAIL OF NORTH FRONT AND PORTICO

MALCONTENTA, NEAR GAMBARARE, CANALE DI BRENTA

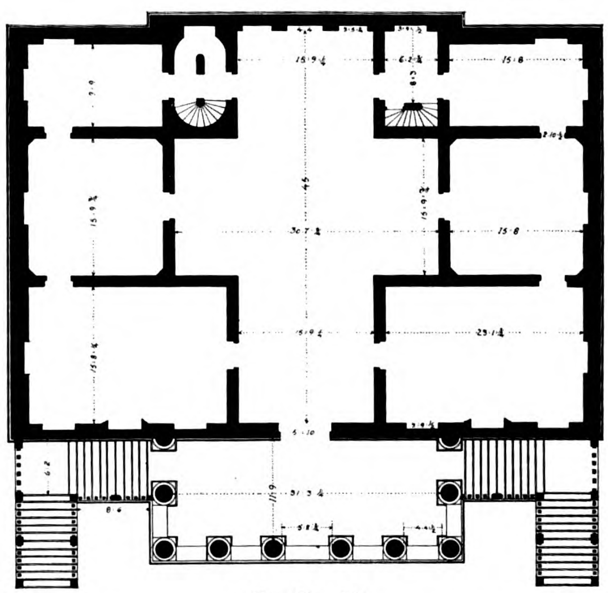


Detail of Loggia Entrance

of artificial means, by examining the reproductions from the eighteenth century prints of Coronelli and Costa (shown here through the courtesy of the librarian of the Biblioteca Marciana) which, notwithstanding some of their quaint, strained perspectives, convey a reasonably accurate idea of the appearance once presented by the villa with its accompaniment of subsidiary structures—the retaining wall along the canal, graced by urns; the water steps; the arcaded garden enclosure to the south; the chapel and other adjacent buildings; to the east, beyond the bend in the stream, the spacious *piazza* enclosed on three sides by loggias, a *piazza* which the Venetians used to compare with that of St. Mark's; and, not least of all, the engaging evidences of canal life and customary modes of transportation.

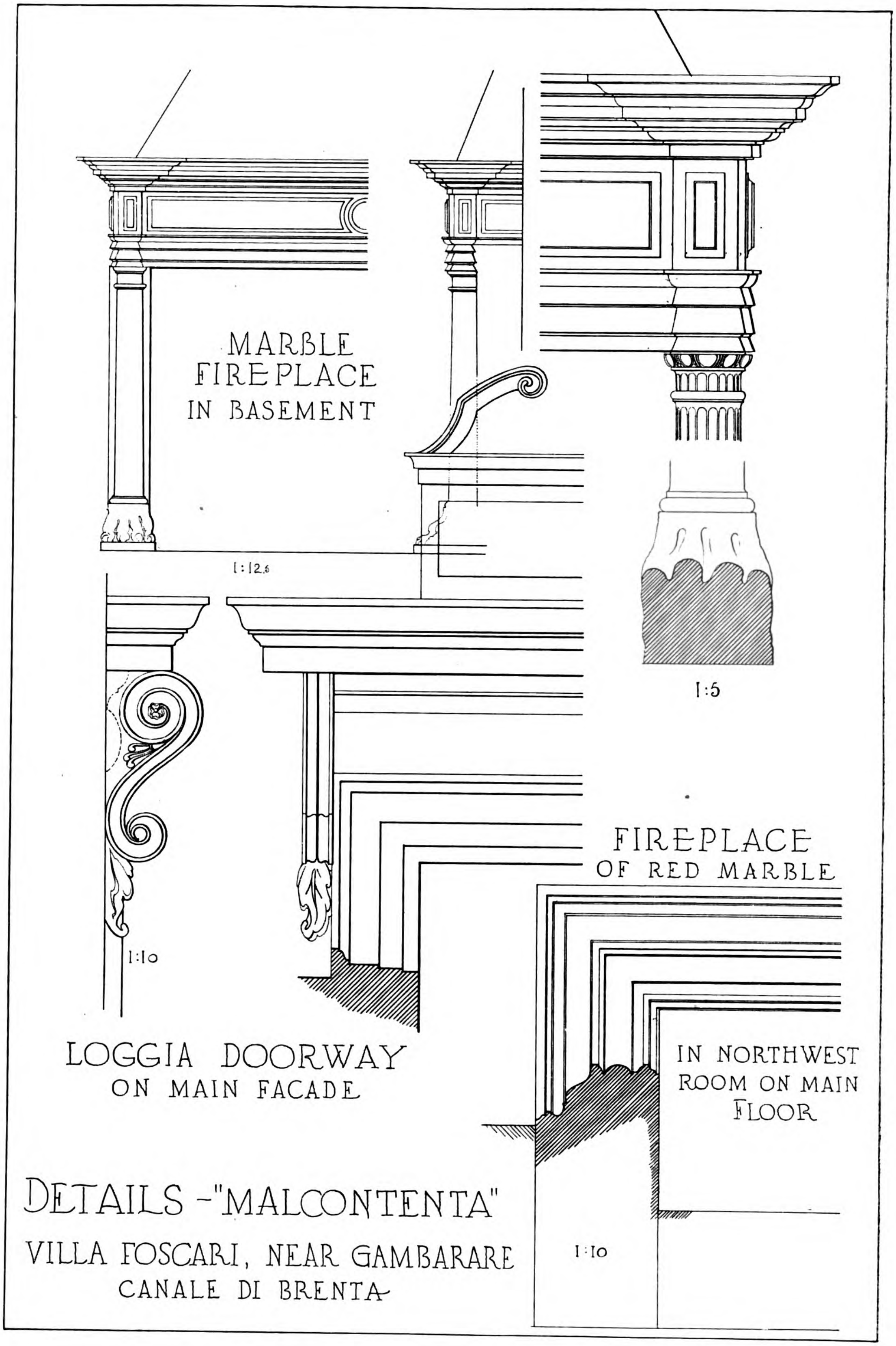
Malcontenta is built of brick and coated with stucco. Projections for all mouldings and cornices are roughly formed, first of advanced brick courses of the necessary proportions, and then finished smoothly with stucco. The steps to the loggia are of marble; the balustrades, the plinths and bases of the columns, and the sills of the windows are of white Istrian stone such as one sees everywhere in Venice. The shafts of the columns are composed of shaped bricks and then coated with stucco, while the capitals are of terra cotta painted or stucco-washed. Over the entire building the stucco was finished with an exceedingly well executed *marmorino* surface, so that in many places—especially the south or garden front—much of the original cream color still remains. Elsewhere, under the action of sea air, weather and the growth of minute lichens, the walls have assumed a silver gray and thus approximate the appearance of old stone.

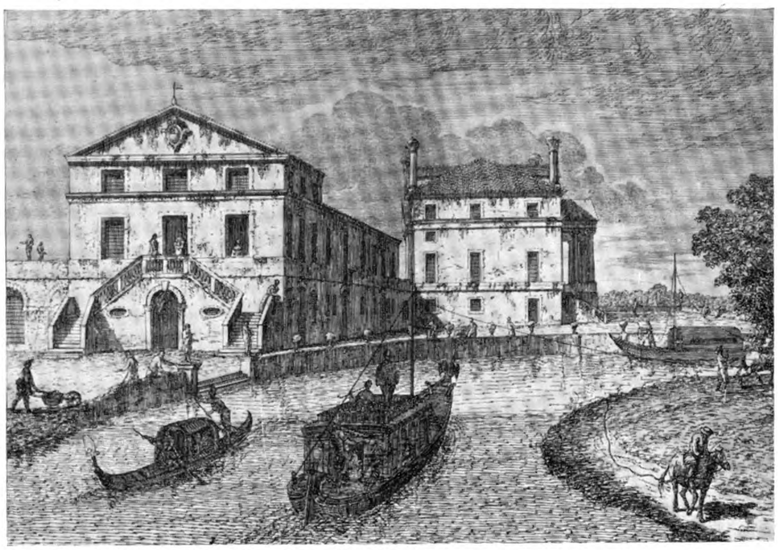
In the great cruciform *sala* of the principal floor are yet visible considerable portions of once brilliant frescoes, and doubtless more will be revealed by the careful removal of sundry coats of whitewash. In the large front chambers on the north side of the house, which contain vigorously designed red marble chimneypieces, one of which is illustrated, the frescoes and the "painted architecture" have fared



First Floor Plan

Measurements in Vicentine feet; increase one-seventh for equivalent in English feet


MARBLE
FIREPLACE
IN BASEMENT
1:12.6
1:5
1:10
LOGGIA DOORWAY
ON MAIN FACADE
FIREPLACE
OF RED MARBLE
IN NORTHWEST
ROOM ON MAIN
FLOOR
1:10
DETAILS - "MALCONTENTA"
VILLA FOSCARI, NEAR GAMBARARE
CANALE DI BRENTA



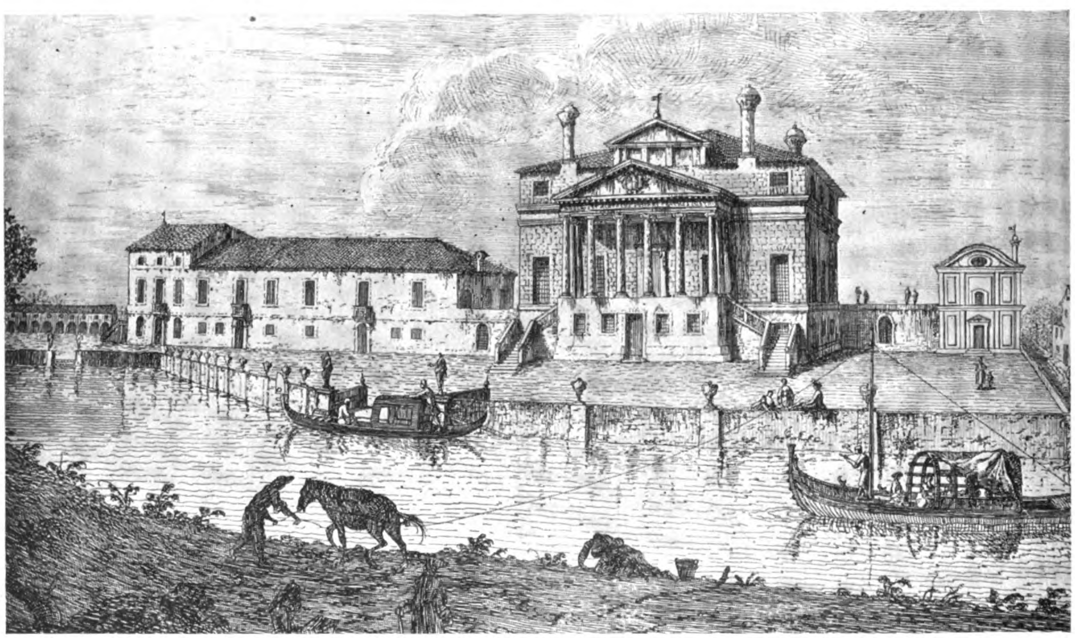
An Early Engraving Showing Malcontenta from Canal Approach

badly through neglect and ill usage, and are very dim. However, in some of the smaller rooms, the Arabesque decorations reminiscent of Giulio Romano's manner, the "painted architecture," and the landscapes in the lunettes of the ceiling are still fresh and clear. The chimneypiece with fluted pillars, now in the basement but obviously removed thither from one of the upper rooms, is of white marble but has been successfully disguised under a thick coat of gray paint.

Messer Battista Venetiano, already mentioned by Palladio as one of the painters who helped to adorn the walls of Malcontenta, we have met before as a fellow worker with Paolo Veronese in the Villa Emo at Fanzolo; we have also seen that he was sometimes known as Battista Zelotti, but more correctly as Giovanni Battista Farinati. Some of the frescoes at Malcontenta have been ascribed in the past to Paolo Veronese. Here and there are fragments of full-blooded design that might well have come from his brush, but the meager remnants visible at the present time seem scarcely sufficient to establish provenance. Whether the attribution be correct or not, there is nothing inherently improbable in the supposition that Veronese, then rising to the height of his fame in Venice, may have been called in to complete the work cut short by Battista Franco's death in 1561.[1]

We know Veronese's association with both Farinati and Palladio, and nothing seems more natural than that the two painters should have worked together to glorify the interior of Malcontenta, as they worked together in other villas of Palladio's. At all

[1] Battista Franco died in 1561, not in 1580, the date frequently but incorrectly given. As Palladio's book was published in 1570, he could not have recorded the demise of a man who did not die till ten years later.



An Early Engraving Showing the Villa Malcontenta and Its Original Appendages

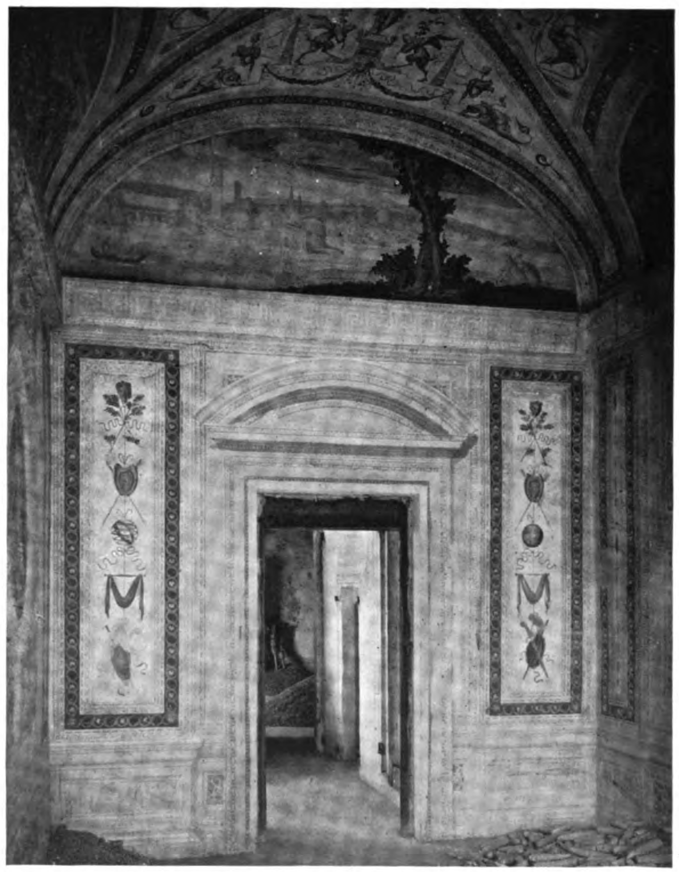
Marble Fireplace in Basement

Red Marble Fireplace Surround

events, the presence of glowing color on the walls of Malcontenta, Emo and Maser—to name only three of Palladio's villas fully adorned with frescoes, with the architect's full concurrence—should be quite enough to overturn the erroneous notion, apparently entertained in some quarters, that Palladio's creations were cold and lifeless things, devoid of human warmth and without any appeal to or consideration of the emotional side of man's nature.

As the plans disclose, Malcontenta consists of a single solid block without wings, and Palladio seems never to have incorporated in his layout any provision for the various dependencies. The *sala* of the grand floor, as the pivotal feature of the plan in the villas of the Veneto, has already been commented on elsewhere. It may be well to remind the reader that the *sala* is lighted not only by the three central south windows but also by the semicircular Roman window above them. The staircases are inconspicuous features and, being of purely utilitarian function, without architectural emphasis.

In his reference to Malcontenta, Mr. Fletcher observes that it is peculiarly "interesting as being the forerunner of many of the eighteenth century (or pediment and portico) houses in England." Quite apart from this consideration and the significance imputed to it as one of the earliest means of fixing the Venetians' attention upon Palladio's ability, Malcontenta makes a strong appeal in its own independent right as an exceptionally fine and satisfying composition. Allusion has been made in a previous paper to Pal-



Frescoes in Small South Room

ladio's fertile ingenuity in contriving widely divers compositions from a limited number of motifs. In this connection common justice and a sense of fair play bid us discount the strictures made by sundry writers upon what they are pleased to term Palladio's frigid, *jejune*, academic manner, the "specious, vapid purity" of his style, and his poverty of vital invention. Palladio chose to impose upon himself certain limits within which to exercise his powers of invention. He was doing in architecture what Palestrina and other contemporary polyphonic composers were doing in music. The marvelous beauty of their music was in no wise lessened by the strict contrapuntal forms the polyphonists followed; neither were Palladio's ingenuity and originality fettered by the canons he set himself.

View of South or Garden Front

Detail of Portico Columns, Villa Malcontenta

As M. Yriarte observes, "those rules were a bridle, a check, but the great artists of the day launched, notwithstanding, into signal elasticity of genius, into the most original combinations."

It is one irrefutable indication of Palladio's real genius, originality, and complete mastery of his art that he could always impart a striking individuality to each new subject and yet keep within the bounds —not slavishly but intelligently—of the precedents he had elected to follow. It might be well if some of the moderns, who are crying up a specious originality independent of all precedent, would learn a lesson out of Palladio's book.

Just as the great English architects of the eighteenth century drew from the work of Palladio the inspiration for their splendid houses in country or town, American architects of the twentieth are turning to the same source, and the half ruined remains of Italian villas such as Malcontenta afford a wealth of inspiration which by flowering anew will extend the Palladian tradition.

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

Central Vacuum Cleaning Systems

By E. J. SKILLMAN

A CENTRAL vacuum cleaning system, which is usually designated as the "stationary" type to differentiate it from the portable or movable type of cleaner, is given very careful consideration by architects and engineers in planning all types of buildings from the small residence to the larger commercial building. Vacuum cleaning has passed through the same stages of development as the automobile and cannot longer be considered as experimental.

It is obvious that many advantages are possessed by a central system for cleaning in which all the dirt from the building is conducted to a central point in the basement, and the air itself, which after being mixed with the dirt becomes very foul, is exhausted into the flue and out of the building. These advantages belong to the central system, when properly installed, rather than to the portable type vacuum cleaner. There are places where the small portable cleaners have their use, but in this discussion we wish to consider only the complete installation.

During the development period of vacuum cleaning the manufacturers made various claims for their apparatus,—some urging high vacuum and low volume, others medium vacuum and volume, and others low vacuum and high volume. It has been finally determined that the proper method of measuring the cleaning value of any machine is to have a definite vacuum at the end of hose lines, where the cleaning is being done under cleaning conditions. When cleaning carpets a high vacuum and a small volume are necessary, and when cleaning bare floors a lesser vacuum and greater volume are necessary. Properly designed vacuum cleaning systems will today produce the right proportion of vacuum and volume at the end of the hose for both bare floor work and carpet work. This proportion remains uniform, not only for different kinds of cleaning but also for different distances from the machine, having the same efficiency on the top floor as on the ground floor.

For commercial cleaning, where the cost of labor must be considered, the vacuum cleaning system should be specified to meet this capacity test:

"This system shall be subject to what is known as the orifice test. The vacuum producer shall maintain a substantially constant vacuum under all working conditions and be capable of maintaining for each sweeper at the end of 50 feet of hose, not over 1½ inches diameter, attached to any inlet valve in the building, a vacuum of not less than 2 inches of mercury while a round, sharp-edged orifice ⅞ inch in diameter is wide open, and a vacuum of not less than 3 inches of mercury while a round, sharp-edged orifice ⅝ inch in diameter is wide open. To determine whether the apparatus meets these specifications one outlet for each sweeper, which the apparatus is to operate simultaneously, shall be selected by the engineer making the test. To each of these outlets shall be attached 50 feet of hose the size used with the system. In each of these lengths of hose, excepting one, shall be placed a plate ⅛ inch thick with a ⅞-inch round, sharp-edged orifice through it. In the end of the hose where the test is to be made shall be placed a hollow metal globe, substantially 4 inches inside diameter, to the top of which shall be attached a vacuum gauge and in the side of which shall be a ⅞-inch round, sharp orifice. The vacuum gauge under these conditions should show not less than 2 inches of mercury. A similar test shall be made, using a ⅝-inch orifice instead of ⅞-inch, under which condition the vacuum gauge must not show less than 3 inches of mercury."

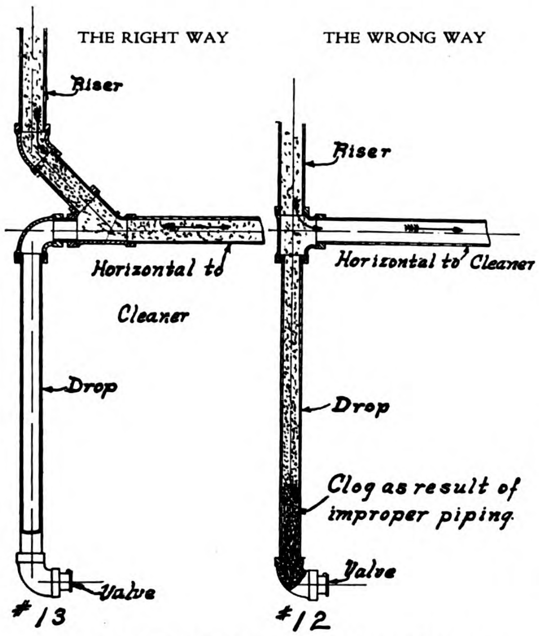
Any machine meeting this capacity test will give for each sweeper specified a cleaning efficiency at the tool end which will make possible the quick and thorough cleaning of not only carpets and rugs but bare floor surfaces whether of wood, terrazzo, marble or linoleum.

There are but three types of vacuum cleaners being manufactured today,—the multi-stage turbine type, the single-stage turbine type, and the double-impeller pump type. It is important that the installation of a vacuum cleaning system be given consideration at the time the plans are being drawn so that the piping may be properly laid out in conjunction with the heating, plumbing and ventilating, and that the benefit of competitive bidding on the piping may be had. The cleaning plant itself, with the hose, tools and inlet valves, can be included in the plumbing contract or purchased by the owner or general contractor as may be more convenient.

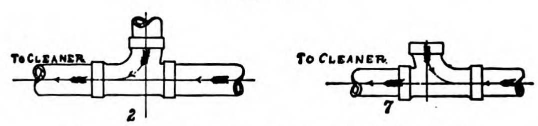
The piping system is quite as important as the selection of the machine. This piping should be planned so that any part of the building may be reached from the various inlets, using not over 50-foot lengths of hose. While it is possible to use

75 feet or even 100 feet of hose and still obtain comparatively good cleaning results, it should be remembered that the hose will wear out and the pipe will not, and that the labor cost is much greater when long lengths of hose are used. The proper kind of piping for vacuum cleaning is either black iron or mild steel, and all fittings are to be of the long turn, recessed drainage type. All pipe should be reamed to the full inside diameter, and all fins or projections removed and screwed "home" full against the shoulder of the fitting so as to leave a smooth, uniform bore.

These illustrations show the right and wrong methods of installing fittings for vacuum cleaning work.



Showing Pocket Avoided by Use of Proper Pipe and Fittings at Left

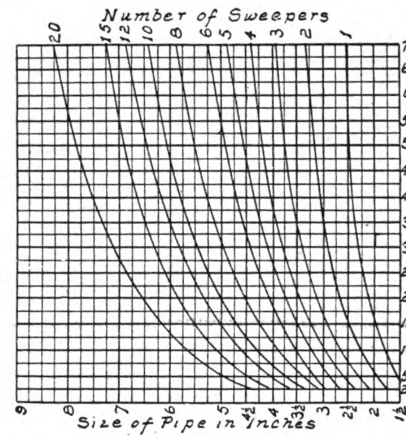


Always Place Y-branches So They Will Turn in the Direction of Flow

The piping should not be so small as to require too high vacuum, high velocity and low density with the accompanying reduction in carrying capacity and increase in "sand blast" wear, nor, on the other hand, so large as to reduce the velocity sufficiently to permit settling. For commercial cleaning no rising line should be of less than 2½ inches, to avoid the possibility of stoppage from matches, toothpicks, hairpins, etc.

To determine the proper size piping for a vacuum cleaning system of one-sweeper and up to 20-sweeper capacity, the curves shown in the illustration included here should be used.

The diameter of pipe for vacuum cleaner systems may be determined by following the curves showing the number of sweepers to the intersection of the horizontal line giving the length of feet from the vacuum producer at the right. Directly below this intersection in a vertical line the size of pipe will be found. This applies to the actual number of sweepers likely to be in operation simultaneously on any branch of the system and not to the number of attaching points. Add 10 feet to the length of pipe in system for each 90° elbow.



An exhaust pipe should always be run from the machine to dispose of the foul air. This exhaust pipe should lead into the boiler flue or in the breaching surrounding it, or to any flue which has no opening above the basement.

The specifications should also call for the installation of a rubber sleeve or sound-breaker, to be placed next to the machine on both the intake and discharge lines. This is to prevent the transmission of sound and vibration. Inlet valves to which the hose is attached should be specified in finish to match the surrounding hardware and should be preferably of the spring closing type, and in school buildings should be called for in lock type. It is the usual practice to place these valves in the center of the baseboard, but where it is too narrow to permit of this being done they should be placed not over 10 inches from the floor which will prevent the hose breaking at this point.

Vacuum cleaning systems designed to meet the capacity test as called for can clean with each sweeper specified 3,000 square feet of carpeted surface per hour or 7,000 square feet of bare floor surface per hour. By taking the total square foot area of the building and figuring the approximate amounts of bare floor and carpeted space to be cleaned the number of sweepers necessary to clean any size building may be quickly determined, based of course on the number of hours during which the cleaning can be performed.

A recent treatise on vacuum cleaning claims that an ideal vacuum cleaning system would be one which when installed in any building will displace all appliances used for dry cleaning. A central cleaning system with a proper system of piping and capable of meeting the capacity test mentioned in this article will make this possible, and will not only greatly promote the sanitary conditions in the building but will do the cleaning with saving in the cost of labor as compared with the old methods.

Electrical Wiring Layouts for Schools

(CONTINUED)

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE importance of each of a number of departments of a modern school building demands that considerable attention be given to its wiring specifications. The architect will find it necessary to plan carefully for the adequate and yet economical supplying of a department's present needs, with an eye also to its possible requirements a few years hence.

The Chemistry Laboratory. This department will require the same lighting, low tension clock and bell equipment as the physics laboratory, and to a certain extent the same table equipment, the lighting circuits feeding from the corridor panelboards and the tables and special apparatus feeding from circuits controlled from the local panel or switchboard in the room. The instructor's table should be equipped with receptacles connected on 110-volt alternating current, on 10-volt direct current, and in some cases 110-volt direct current is also used. All receptacles should be of the polarized type. The students' tables will require receptacles for 10-volt direct current, as it is seldom that voltage of other than 10 volts direct current will be required at the students' tables unless special work is to be done, and information regarding this can be obtained from the school authorities before the plans are completed. In some of the smaller schools it is customary to omit the use of table outlets for the students, the full equipment however being provided at the table of the instructor; when this is done, and when low voltage is required by the students, the current is provided by means of portable storage batteries.

Where wall tables or benches are employed, provision should be made for receptacles at these tables, so that small motor-driven grinding machines, testers, and a centrifuge may be used; the receptacles may be set in the wall at a point over the table, and as the machines used are of the portable type they may be connected with the circuit with the standard plug, such receptacles of course feeding from the alternating current service. If bakers are to be used in the laboratory, each outlet should be fed from a single circuit; the receptacle should be of not less than 30-ampere capacity, and the circuit should be of No. 8 wire. It is seldom that more than one receptacle of this capacity is required in the laboratory.

Provision must be made for the local ventilation of chemical hoods where the fume closet is installed; but one fan will be required, this set in the attic space or in the vent duct. "Ready to run" sets may be employed for this work, but in no case should the motor be installed in the duct or in the direct draft, as the acid fumes will quickly ruin the motor. The fan may be located in the duct, with the motor set on a shelf at a point outside the hood, the fan connected with the motor with an extended shaft. As these sets are of small capacity, the circuit may be taken from the lighting mains and from the nearest corridor panelboard, as a rule employing 220 volts and feeding the motor from the 220-volt buss bars on the panel. The motor may be controlled by means of one of the standard "heater combinations," consisting of a double-pole switch and pilot lamp mounted under one plate and at a point adjacent to the motor or vent hood; the pilot lamp or "bull's eye" will glow when the motor is in operation, thus tending to prevent the motor's being left running when not required. The controlling switch may be of the flush, key type so that the motor cannot be operated by the pupils, or a standard push-button switch may be used on the plate, and the line canceled when not in use, at the panelboard. The pilot may, if required, be independent of the switch plate and may consist of a flush socket set at a point near the ceiling of the room, so that a standard 25-watt red lamp may be used as a pilot.

Where the students' tables are individually vented, the several tables are fitted with hoods, all connecting with a metal duct which in turn passes either above the tables or down and under the floor and to a large vent fan either in the attic space or in a pent house on the roof. With this equipment a motor of from 1 to 2 horsepower will be required to operate the fan, and a remote-control type of push-button starter should be installed at the motor, the controlling push-button being carried back and installed at a point near the instructor's desk or on the controlling panel for the laboratory; a pilot lamp is of importance, as it indicates when the motor is in operation.

The General Science Laboratory. As employed in the smaller schools, the general science laboratory does not require elaborate wiring, since the work carried out is simple and can be cared for without the use of stationary wiring to the tables. One method that has been found to work well is to provide long benches or tables under the windows and along the walls, and to install a number of receptacle outlets over these tables, carrying the circuits either to the corridor panelboards or to a special panelboard as suggested for use in the physics and chemistry laboratories. These outlets are as a rule connected on the alternating current service at 110 volts, as direct current is seldom required for this work. These receptacles permit the use of small motors, testing machines, portable equipment and the charging of storage batteries, through proper rectifying apparatus.

A convenient method of supplying low voltage direct current for the students' tables is by means of a portable table carrying storage batteries; this table may be made up on casters or wheels and

should be approximately 24 inches square. The table is fitted with a lower shelf on which the batteries are mounted; the batteries may be of the automobile type or of the glass jar type, or again the Edison type of battery may be used. The top of the table is fitted with binding posts, and instruments are used on the table top and connected with the posts referred to. A cutout panel is mounted on one side of the table, this panel containing the circuit-breaker, charging instruments, switches and fuses, while either a chemical rectifier, motor generator charging set, or a rectifier of the tungar type is mounted on the battery shelf, the whole making a self-contained unit which may be plugged into any alternating current outlet for charging. When low voltage is required at the students' tables, the portable table is rolled into position, wires are led from the binding posts to the equipment under demonstration, and instrument readings taken from the table top.

The Library. The lighting of the library will depend primarily on the size of the room and upon the type and location of the furniture used; it may be by means of low ceiling illumination, balanced by individual lighting on tables, or wholly by means of ceiling fixtures. As a rule, however, for this work, from four to eight ceiling fixtures are employed, these outlets spaced to give general illumination throughout the room, at a value of from 6- to 8-foot candles, fixtures of the semi-direct type being used. Where it is desired to make use of table lamps, fewer ceiling fixtures are employed and these are of lower wattage, as general illumination is all that is required. The table fixtures may be portable and plugged into receptacles on the tables, or fixed table standards may be used, these employing green and white reflectors which keep the light at a point below the line of vision.

The circuits may be controlled from the corridor panelboard and mastered from a bank of switches located conveniently to the entering door. The conduits, where table fixtures are employed, run from the switch outlets down and in the floor construction to points under the tables, bulb tees being set in the floor construction with the tapped bushing level with the finished floor. The plugs are screwed into the bushings until the time that the tables are in place, at which time the plugs are removed and short pieces of conduit screwed into the bushings and terminating in outlet boxes on the under sides of the tables. The fixture stems pass through the table tops and all connections are made in the outlet boxes. If it is desired that no conduits show from the floor to the under side of the tables, the table legs may be drilled to a point near the table tops and the leg slipped over the conduit and connections made at points close to the table tops; when this is done an outlet box should be set in the table leg, or flexible armored conductor may be used from the floor outlet through the leg to the outlets.

Corridors and Stair Halls. With the exception of the main entrance, corridors and stair halls are as a rule lighted by means of direct ceiling fixtures of the ceiling collar type, these being spaced approximately from 20 to 22 feet on centers. These fixtures are fitted with some type of enclosed globe for use with 100-watt, Type C bulbs. All lights throughout the corridors, stair halls, toilets and elsewhere (where the students are likely to interfere with the switches) should be controlled by flush switches of the lock type, these set either singly or in banks. As keys are required for the operation of these switches, the lighting of the corridors, etc., cannot be interfered with by the students or by persons without keys.

It is further customary to control the lighting circuits of the corridors by means of three-way switch combinations, these located at each end of the corridor, the lighting fixtures to be connected alternately on the circuits so that half or the whole of the illumination of the corridor may be controlled from either end. Where corridors branch at right angles, a four-way switch is cut into the circuit, thus permitting four points from which the lighting may be controlled. The lighting outlets throughout the stair wells should be connected to feed from a single circuit, and as a rule from the first floor or basement panelboard, the circuit looping from the basement or first floor and connecting all of the outlets on the different landings. The circuit may be controlled by means of one lock switch, set at a convenient point on the first floor landing, or if desired three-way or four-way switch combinations may be used so that the whole lighting of the stair well may be controlled from any of the landings.

The outlets at the entering doors should in all cases be controlled by double-pole switches, and it is well to use no switch for the work of less than 10-ampere capacity; the outlets may be of the wall type for use with outside brackets or for the use of standards. Where the bracket fixtures are used for this work, conduit and the standard rubber-covered wires are all that are required; where, however, standards are used and are set at some distance from the building, the wire used should be lead-sheathed in addition to the rubber insulation. It is well to control all outside lighting on separate circuits from the nearest panelboard, the switches for this being on the panelboard, though if this location is not convenient lock switches may be cut into the circuit at some central point in the corridor.

Lighting of Grounds. Where the grounds are extensive and it is desired to use a number of lights, along the walks, at circles and at steps, etc., cast standards are usually employed, each fitted with one or a number of lamps. The wires are run underground from the building, connecting the standards on one or more circuits. While galvanized conduits and lead-sheathed wires may be used for the connection of the outside lighting, it is more convenient and less expensive to make use of steel-armored cables of the "park type." The conductors, being lead-sheathed and covered with steel tape (the tape in turn served with tarred jute), make the cable

proof against mechanical injury as well as waterproof. The cable is laid in one piece between outlets, all splices being made at the outlets, and as this cable is nearly as flexible as a piece of rope it can be installed where it would be impracticable to make use of rigid conduits.

The Gymnasium. The high school gymnasium, if of any size, should be wired as a unit and made independent of the other circuits of the building. It should be controlled from one or more panelboards and should have an independent feeder from the main switchboard.

It is becoming the practice to have the gymnasium divided into two halves, for use of the boys and girls, the room being divided either by means of folding doors or by a curtain; thus for school purposes the halves are used separately, while for exhibition purposes the doors are opened or the curtain raised and the room used as a whole. With this arrangement it becomes advisable to wire each half separately, each to be controlled from an individual panelboard; both boards, however, may be connected to the same riser or feeder. The locations of the panelboards should be convenient to the office of the instructor, and all circuits of the room should be controlled from switches on these panels; the panelboards should be of the "dead front type," using either push-button or toggle switches.

The lighting of the gymnasium must be from ceiling outlets, and these should be spaced to give even illumination over the floor. Where trusses are used the ceiling outlets will be spaced either between the trusses or on the lower side of the lower member, and the spacing will be determined by the positions of the trusses. If the trusses are approximately 20 feet above the floor the outlets may be placed on them; if lower than 20 feet, it may be well to space the outlets between the trusses and make use of a suspended type of fixture. In any event, the fixtures used should be of the guarded type, with a substantial wire guard to protect the lamp bulbs. A single Type C lamp of high wattage, set behind a guarded reflector, will give better results in gymnasium lighting than a fixture of the multiple type employing a number of smaller units.

Where the gymnasium is located under other rooms, or where the ceiling is low, the use of any pendant or exposed type of fixture is objectionable, as it is likely to deflect a ball. Under such conditions the outlets are recessed in the ceiling, permitting a flush fixture to be used. A standard fixture of this type is on the market and includes a large outlet box which is set flush with the ceiling, a receptacle for the lamp and a mirror reflector with a special grille which finishes flush with the ceiling. It is made for lamps of up to 500-watt capacity and is spaced 10 feet or more between centers depending upon the height of the ceiling.

Where the gymnasium has a balcony, provision must be made for lighting under the balcony; as a rule ceiling outlets are used, and the type of fixture just described is rapidly replacing the guarded type formerly used for this work. Where, however, wall outlets are required, as at doors or for pilot lighting, the guarded fixture is the best that can be obtained. For lighting over the balcony, the standard type of ceiling collar is ample, these collars spaced to give uniform illumination over seats, the circuits feeding and controlling from the gymnasium panels. Running tracks, as a rule, will be lighted from the overhead illumination of the gymnasium.

All doors and exits from the gymnasium should be fitted with illuminated exit signs, duplicating those used in the assembly hall. The signs should be set flush and should have the word EXIT in red letters 5 inches in height. Each sign is fitted with two receptacles for 25-watt lamps, the receptacles wired in multiple. For small gymnasiums, where exhibitions are not to be given, the signs are sometimes omitted, but while the code does not at this time demand the installation of illuminated exit signs for school work, nearly all local ordinances require their installation, and in the writer's opinion it will be but a short time before the exits from all school buildings will require exit signs of this type.

The exit signs must be wired on a circuit or circuits separate from all other outlets in the gymnasium and must be controlled from a separate switch and from a separate feeder from the main switchboard. There are two feeders, therefore, from the main switchboard to the gymnasium panels, so that in the event of the main lighting circuit's being cut out from the opening of a fuse or other accident, the exit lights will still be in service. The use of two outlets in a sign is to provide light at the outlet in the event of one of the lamps going out. In addition to the exit signs at the exit doors of the gymnasium, similar signs should be located at all exits in the corridors and from the building that are to be used with the gymnasium, and all of these signs should be connected to and controlled from the exit circuit of the gymnasium. Exit signs should be so placed that there can be no misunderstanding on the part of strangers leaving the gymnasium as to the exits, even when the corridors, etc., may be filled with smoke.

Each half of the gymnasium should have a program bell and secondary clock connected with the school system; the dial of the clock should be not less than 18 inches diameter, and the front should be of wired glass. The clock and bell should be so located that they cannot be readily struck with a ball during a game. The bell should be of the corridor type with gong of from 5 to 6 inches.

With the use of instructors' offices, each office should be fitted with a 12-inch dial clock and local telephone, and where the instructors have (as in some schools) more or less business outside the building, an outside telephone should also be provided as well as one or two wall receptacles for use with portable electric equipment. Where the gymnasium is divided by means of folding doors, no electrical provision has to be made for the opening and closing of these doors; where, however, a

curtain is considered, provision should be made under the wiring contract for the operation of the curtain. This requires a motor circuit (for large curtains, as high as 5-horsepower in capacity), the outlet being located at some point over trusses where connections can be made to the motor. The machinery for the operating of the curtain will be similar to the ordinary electric dumbwaiter push-button hoisting machine, the wire cables operating through suitable pulleys. A master switch outlet must be located near the motor or machine, and a ¾-inch conduit must be run from the location of the machine to the point or points from which the curtain is to be operated. As a rule the point of operation will be near the panelboard in the gymnasium. A push-button switch enclosed in a flush locked cabinet or a standard type of lock switch may be used if desired. The conduit system only is required under the electrical contract.

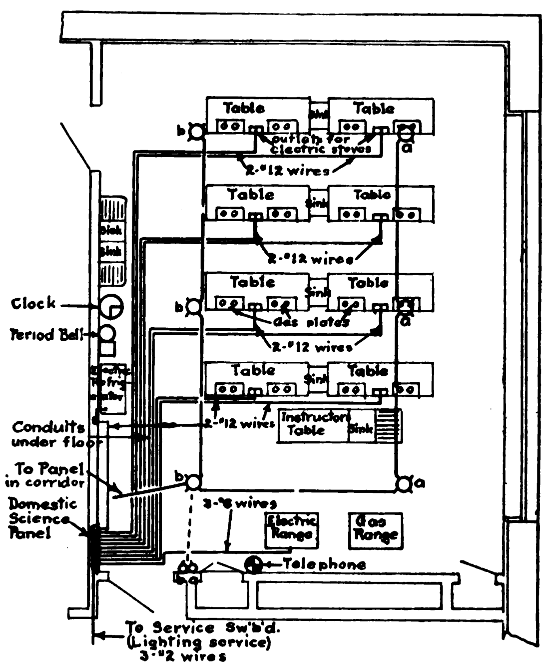
The Assembly Hall. The high school assembly hall will not only be used for school work and lectures, but as a community center will often be used for school plays and even more advanced theatricals; as a result, the hall must have reasonable electrical equipment to permit the work to be carried out. Certain of the work will come under the code requirements for theater wiring, although the details of the equipment will not be as complete as that required for theaters.

The wiring system should be separate from that of the remainder of the building, part being controlled from the stage and part from the lobby panelboards. In general all ceiling lighting, stage wiring, footlights, proscenium lighting, etc., will control from the stage panel, while all emergency, fire escape, moving picture booth and exit lighting will be controlled from the lobby. Separate feeder mains will feed the stage and lobby panels from the main switchboard, and a separate circuit for emergency and exit lighting must be run from the main switchboard to the lobby.

Ceiling Illumination. The type of ceiling illumination used for the hall will depend upon the design of the ceiling, and may consist of pendant chandeliers, reflected light through ceiling glass, or indirect illumination by means of coves or by receptacle outlets spaced in the front of the ceiling beams. Indirect illumination from concealed coves, while satisfactory when properly designed and balanced with some form of direct light, is not as a rule desired, as more wattage is required for the lighting of the room; it is more expensive to install, and since the coves gather dirt, frequent cleaning is required. There is more or less breakage of lamps in the cleaning, particularly if the ceilings are high.

With a flat ceiling the outlets may be spaced as desired, and for this work a simple form of pendant chandelier of the fiber variety, employing a number of frosted ball type lamps, works out well and is not expensive to install. Such fixtures should be provided with lowering winches set in the attic space over the hall, so that the fixtures may be lowered for cleaning and the replacement of lamps. The outlets should be set in the attic space and should consist of polarized receptacles in gang boxes, these circuits being numbered, with corresponding numbers placed on the plugs. The lamp circuits on the fixtures terminate in the plugs so that the plugs may be removed when the fixtures are lowered. The numbered plugs and receptacles permit the connecting of the proper circuits when the fixtures are again in place. When this construction is used the electrical contractor should provide a galvanized iron ground or ring approximately 8 inches in diameter, this to be delivered to the builder and set in the ceiling of the assembly hall at the time of construction, permitting the ready lowering and raising of the fixtures.

Where the ceiling is heavily beamed, fixtures as already described may be spaced at intersections in ceiling panels, the number of course depending upon the ceiling design; as a rule, however, not more than two or four major fixtures and two smaller fixtures over the balcony should be considered. One satisfactory method of lighting a hall with deep ceiling beams is by means of fiber ceiling receptacles closely spaced at the front of the beams. This prevents the source of light being seen from the rear, and reflects the light toward the stage. This method is less expensive than the use of the larger fixtures and gives very satisfactory results. When such receptacles are used they should be connected alternating on the circuits, and controlled from the stage panel so that the whole or a portion of the ceiling illumination may be used.



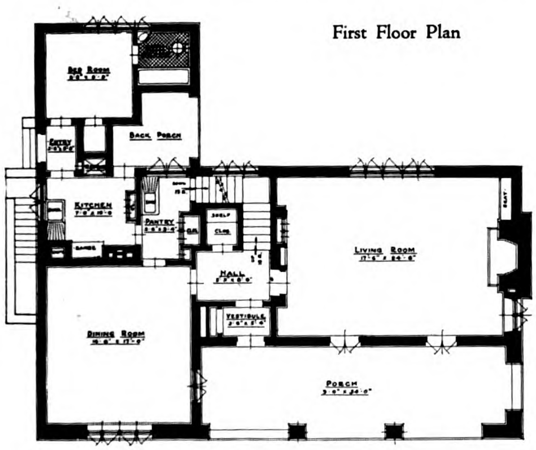
Typical Layout for Domestic Science Room

An Architect's Own House

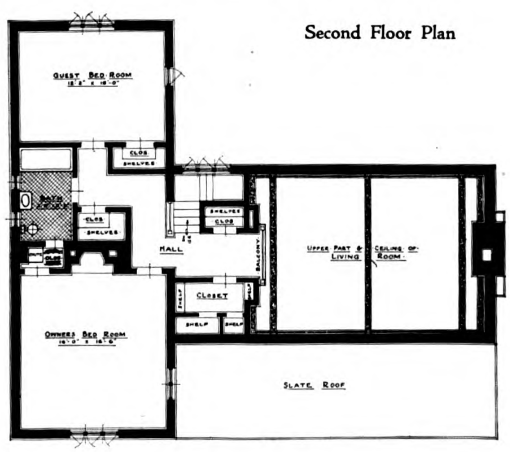
DESIGNED BY F. L. S. MAYERS, OF THE OFFICE OF BERTRAM GROSVENOR GOODHUE

THERE are few buildings which hold forth possibilities more interesting than the home which an architect builds for himself. Here at least he may give free rein to his imagination, unrestrained by the desires or requirements of a client; here he may carry into actual execution plans which perhaps he was obliged reluctantly to lay aside, and with himself as a client work out his free and untrammeled idea of harmony of plan and elevation, of mass and detail.

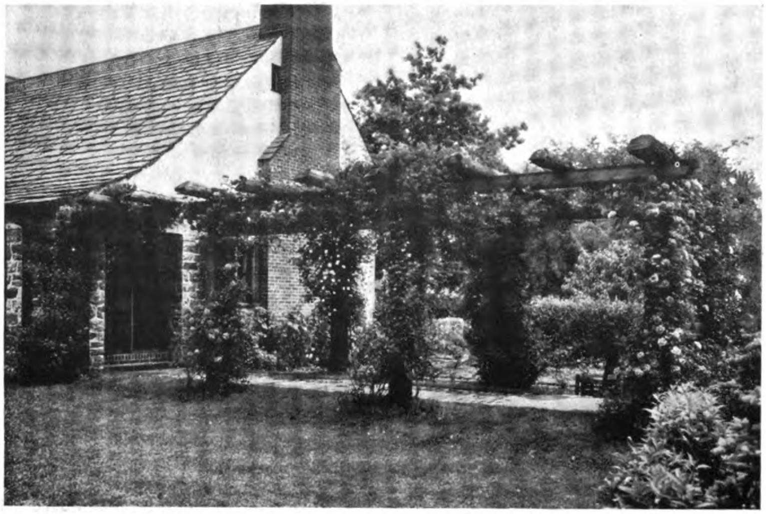
This house at Shippan Point, Connecticut, is built upon a level plot, the ground falling away in front to Long Island Sound; delightful glimpses of the water are afforded through the treetops from the porch, an out-of-door living room, its red quarry floor being raised but two steps above the ground. The lines of the exterior suggest the vigorous grace of the modern English domestic type, the windows with their leaded casements being grouped, which makes possible broad ample areas of wall surface which give an expression of strength and dignity. The color scheme of the exterior, a combination of stone and stucco, is as harmonious as a careful selection of materials could make it; masonry where exposed is of local Connecticut stone, roughly dressed and varying in color from a cool



First Floor Plan



Second Floor Plan

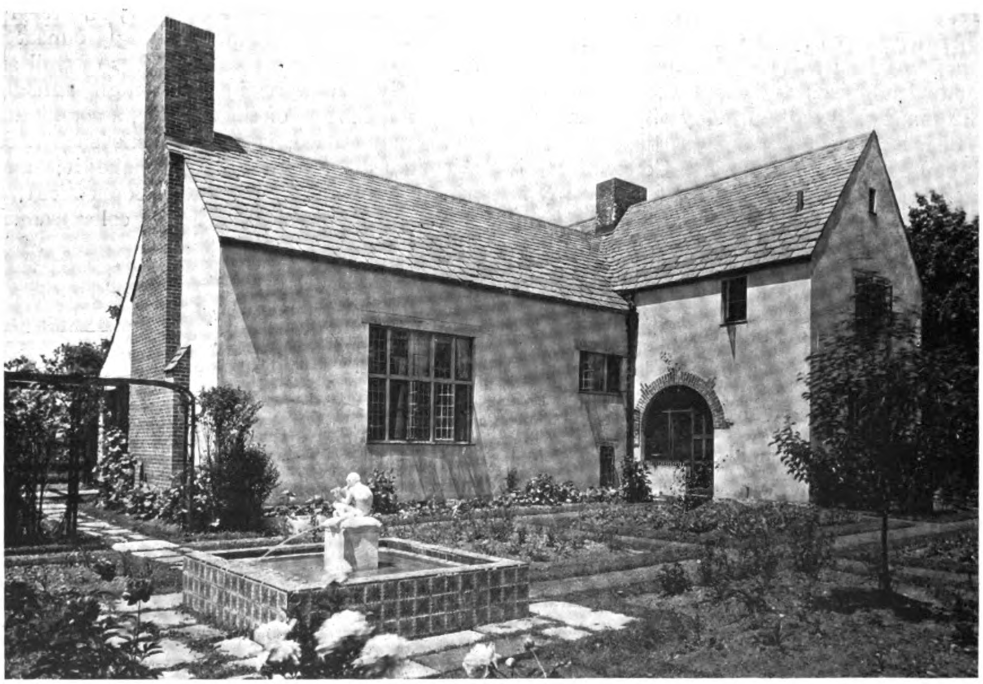


One End of House, Seen through the Pergola

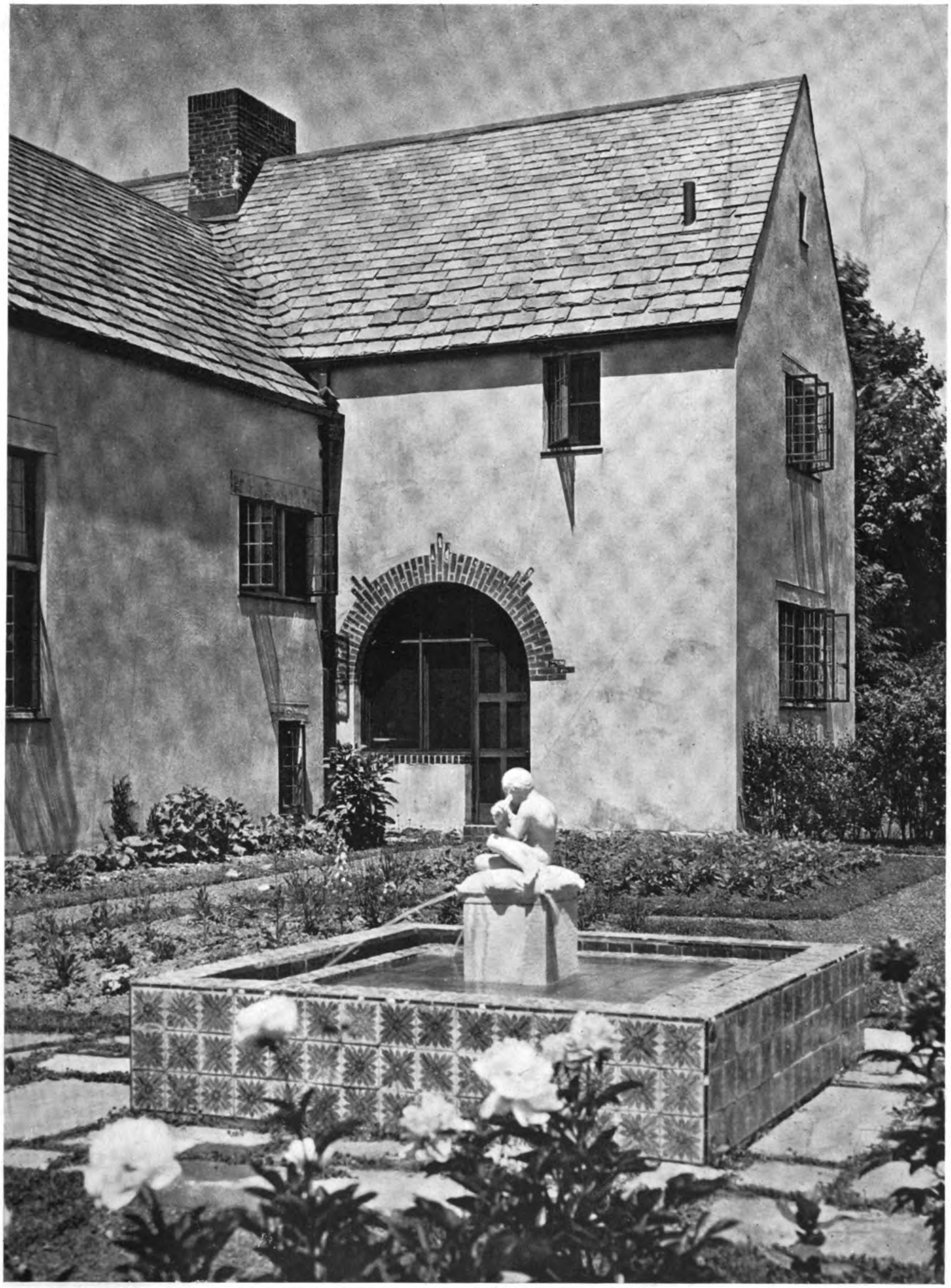
The owner started out with the idea of a "bungalow" in mind,—a "bungalow," that is, in the original sense of the word. The plan is, in effect, a two-story wing, containing dining room, kitchen and bedrooms, attached to a single-story living room and porch, but the welding together of the two parts has been so managed, within as well as without, as to at once express and conceal the union. Interior trim has been reduced in extent to a minimum, in keeping with the studied simplicity of the house's exterior, and is of dull gray-brown oak. The floors of the most important rooms are of random width oak boards, and the walls and ceilings are of rough surfaced plaster with bands or friezes of plaster modeled in low relief.

The plans provide for a small number of spacious and well designed rooms. The living room is full two stories in height, with a balcony at one end which is reached from the upper floor hall. The maid's room with its bath is placed upon the main floor, and the entire upper floor is given up to two bedrooms and their bath, both the bedrooms having window ventilation. Providing cross-

blue-gray to a warm russet brown. The stucco is of a rich, creamy yellow which with the red brick of the heavy chimneys and the arch above the garden entrance adds the necessary touch of warmth. The woodwork of lintels, porch beams and posts and the timbers of the pergola are of a weathered gray. The roof with its broad expanses unbroken by dormers is covered with fading green slates in graduated widths and thicknesses laid with rounding valleys, and ridges and gutters are of copper which is now taking on a soft gray-green tinge.



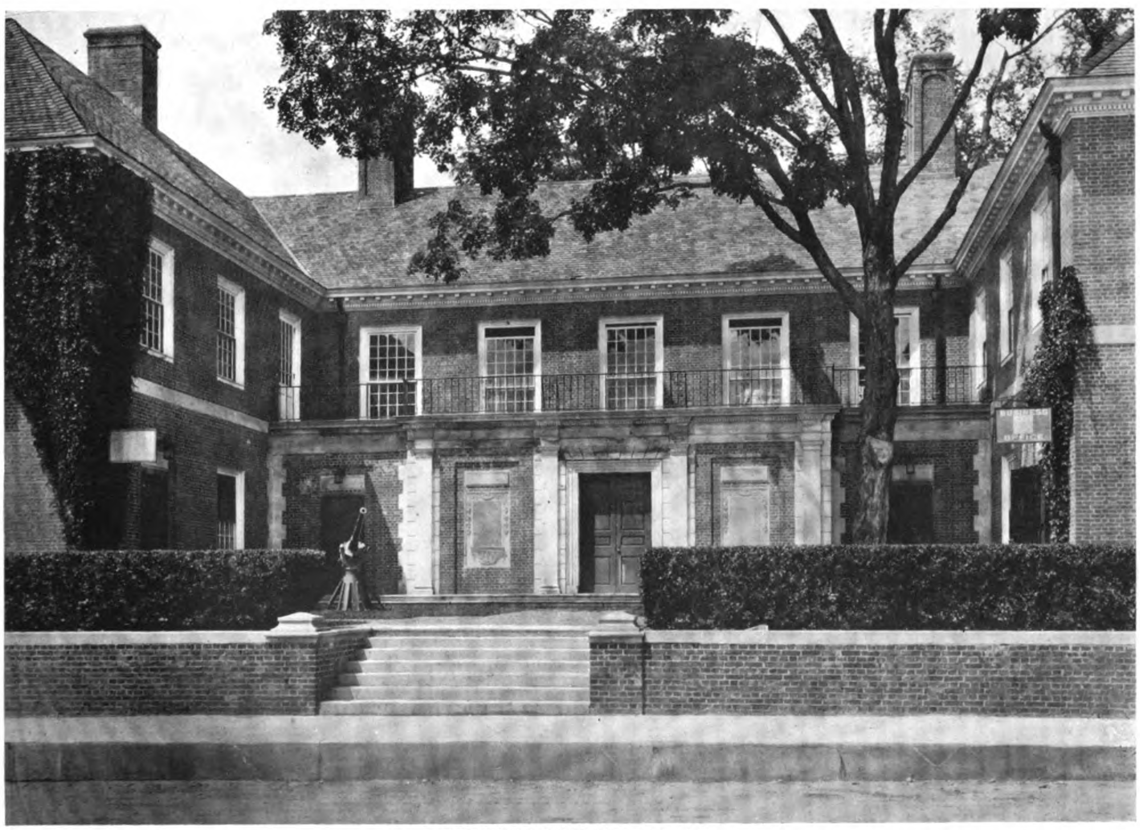
View of the Garden Entrance Showing Casement Windows in Living Room



HOUSE OF F. L. S. MAYERS, SHIPPAN POINT, STAMFORD, CONN.
F. L. S. MAYERS, ARCHITECT

V

GENERAL VIEW



DETAIL OF ENTRANCE COURT

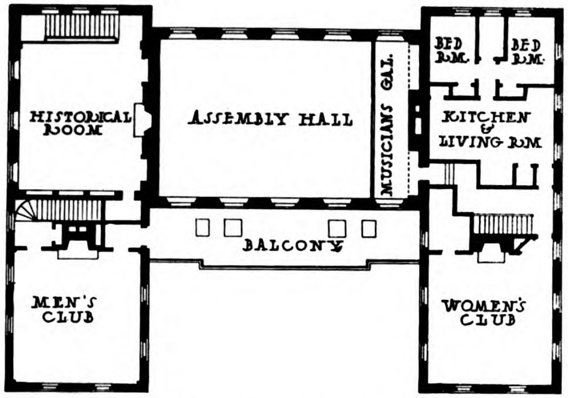
PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

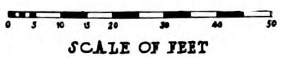
DETAIL OF FRONT, SHOWING TOWN HOUSE IN DISTANCE

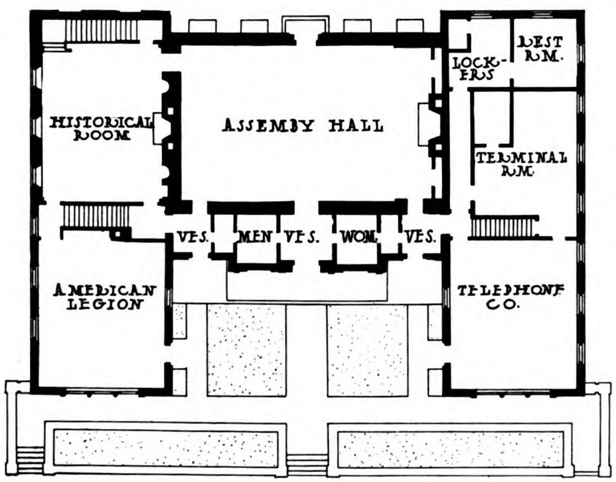
PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS



SECOND FLOOR PLAN





FIRST FLOOR PLAN

DETAIL OF FIREPLACE IN ASSEMBLY HALL

PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

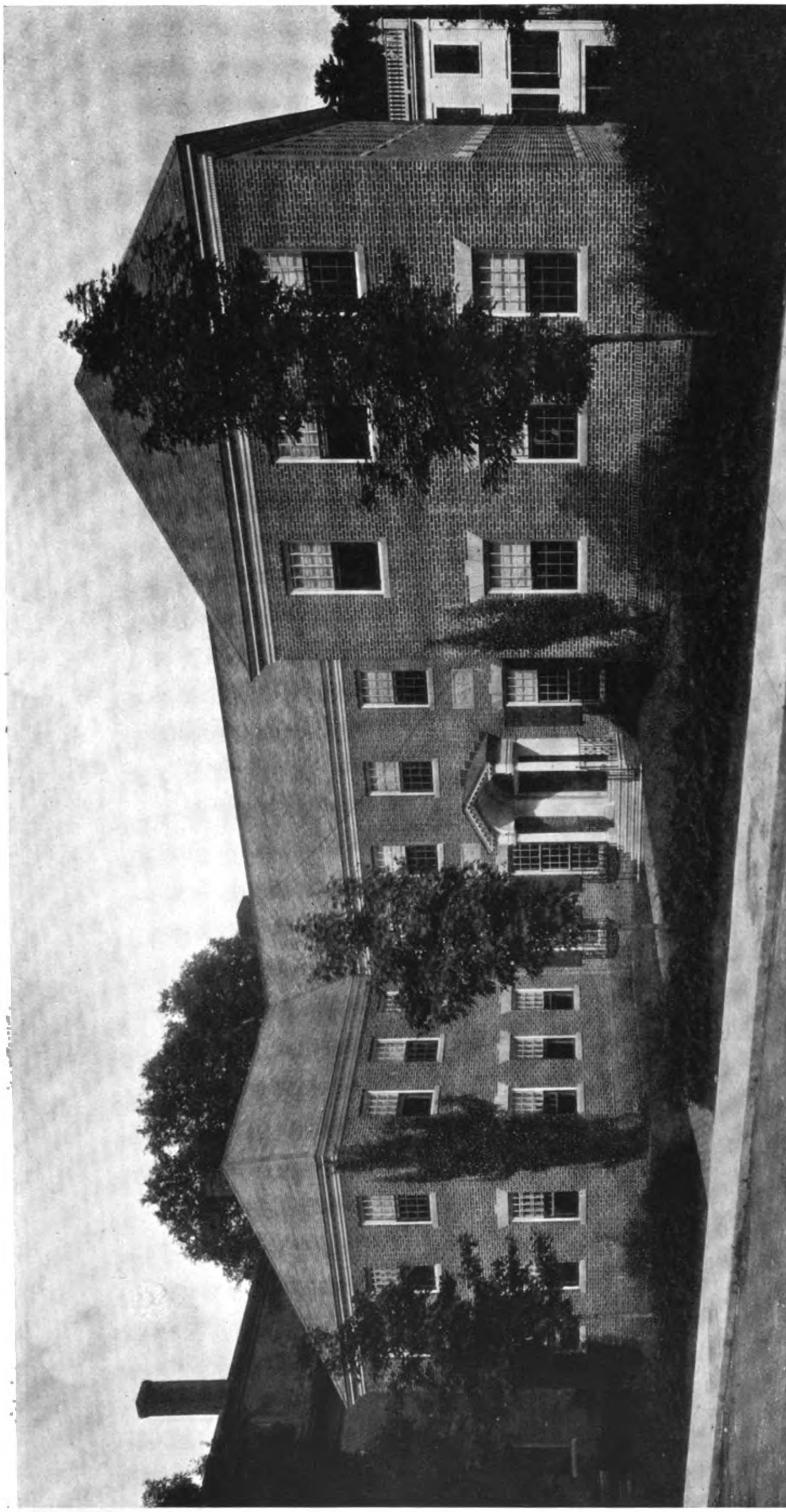
LITTLE & RUSSELL, ARCHITECTS

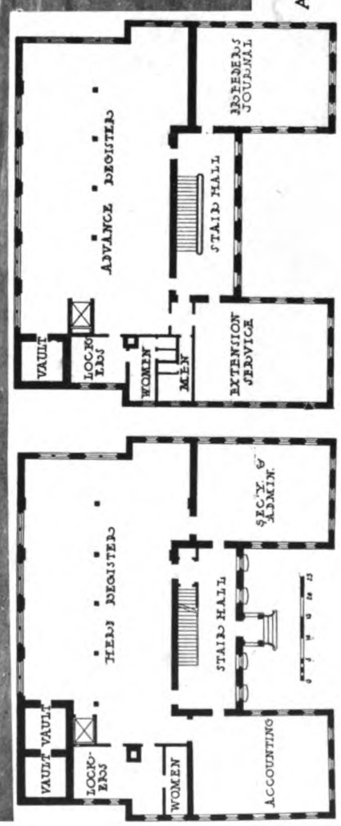
HISTORICAL ROOM ON SECOND FLOOR

HISTORICAL ROOM ON FIRST FLOOR

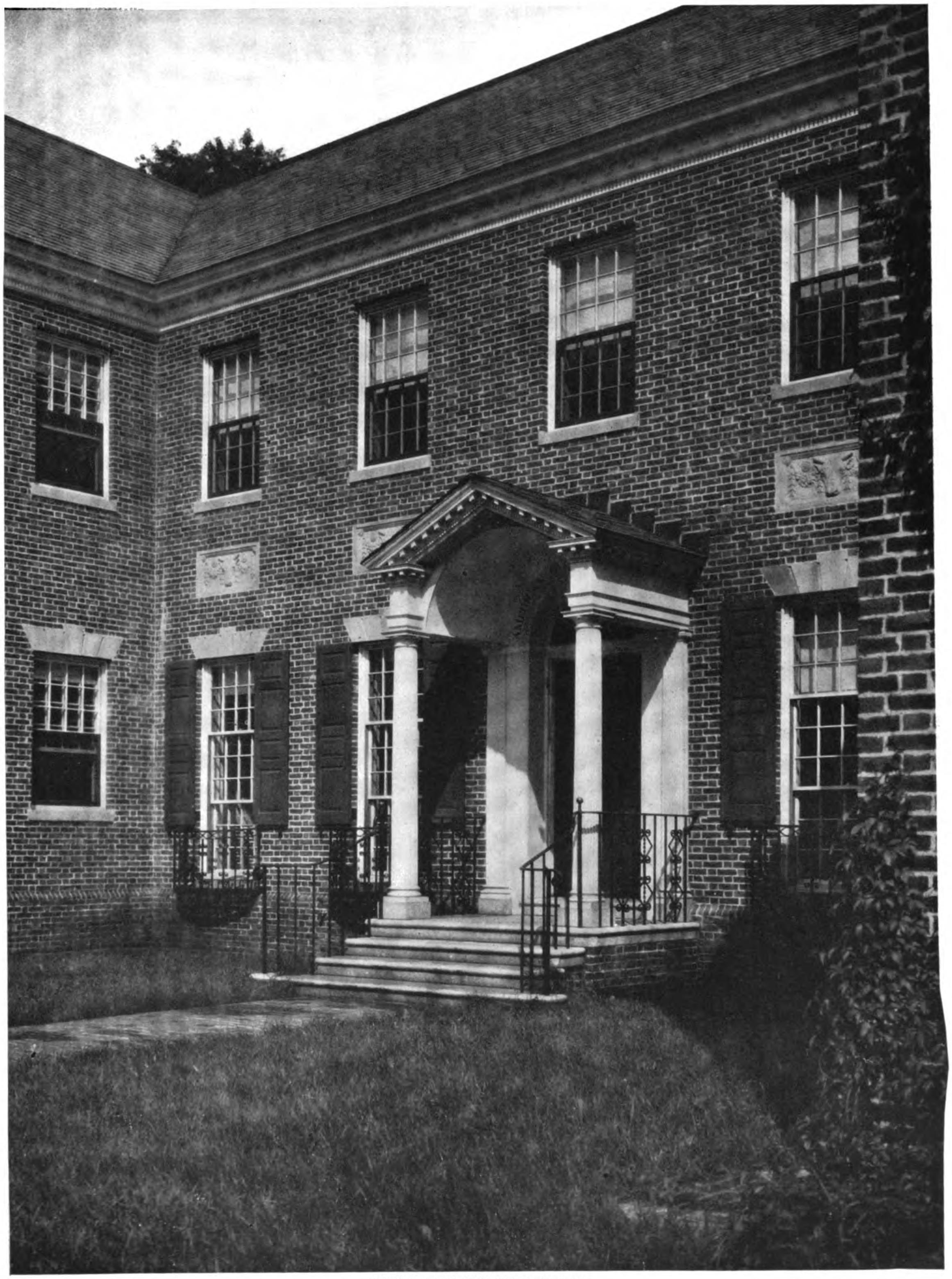
PETERBOROUGH HISTORICAL SOCIETY BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS





AMERICAN GUERNSEY CATTLE CLUB BUILDING, PETERBOROUGH, N. H.
LITTLE & RUSSELL, ARCHITECTS



DETAIL OF ENTRANCE FRONT

AMERICAN GUERNSEY CATTLE CLUB BUILDING, PETERBOROUGH, N. H.

LITTLE & RUSSELL, ARCHITECTS

Concrete Construction

III. TYPES AND LIMITATIONS

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

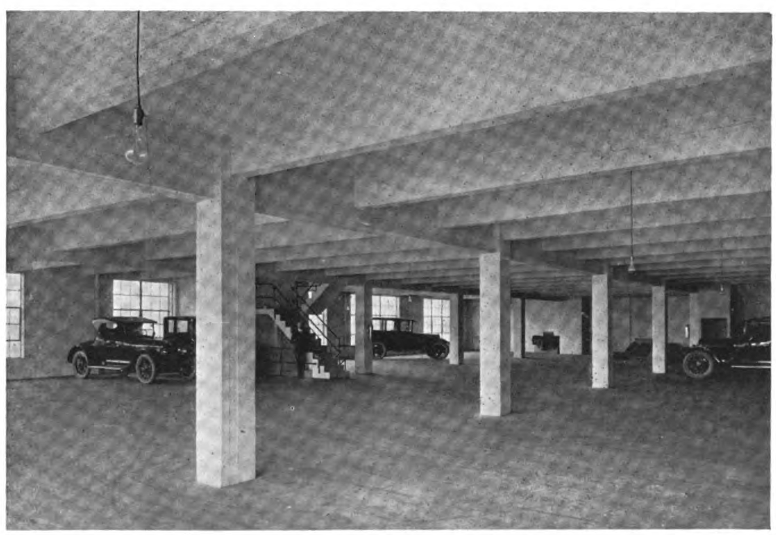
THE use of concrete is not the solution of every structural problem as some enthusiasts would have us believe, but it probably has a wider range of uses than any other building material.

In considering the relative desirability of concrete, wood or steel for complete buildings, the points to be considered are first cost, maintenance and depreciation, appearance, fireproofing qualities and speed of erection. For factories, warehouses and similar structures, first cost is usually the main consideration. For semi-public buildings, such as stores and hotels, a fireproof structure of satisfactory appearance is the first essential, but cost is usually a close second in importance. Only in monumental buildings and in the highest type of residence construction does first cost drop into the background, and even in these classes of construction it has an unpleasant habit of dominating the background. Steel and wood are used only for skeleton framing in connection with masonry walls, excepting for small or temporary construction, while concrete may be so used but may also be used for the exterior walls.

The first cost of concrete construction as compared with wood or steel is a matter of many variables. The required plant for concrete work,—mixer, engine, barrows, carts, etc.,—runs up the cost upon small jobs, particularly if they are located in places not easily accessible. For any city work contractors are equipped with portable mixers having direct-connected motors or gasolene engines which do not carry a very heavy rental charge. Required column spacing and the live loads to be carried are the most important considerations. The dead load of concrete construction is usually heavy compared with wood or steel, so that for very light live loads or long spans concrete is usually more expensive than steel. Normal column spacing for concrete construction ranges from 16 to 30 feet, although most concrete bays are from 20 to 25 feet square. Compared with 10 x 20 bays in wood construction, the saving in floor space by the omission of columns is obvious.

For ordinary factory buildings there is very little difference in cost between concrete and wood construction with brick bearing walls. There have been times in the last few years when concrete was less expensive than mill construction. At the present time for from 100 to 150 pounds per square foot live load the mill construction is perhaps from 10 to 20 per cent cheaper, but it will have twice as many columns. For heavier live loads (200 to 250 pounds) concrete is probably fully as cheap.

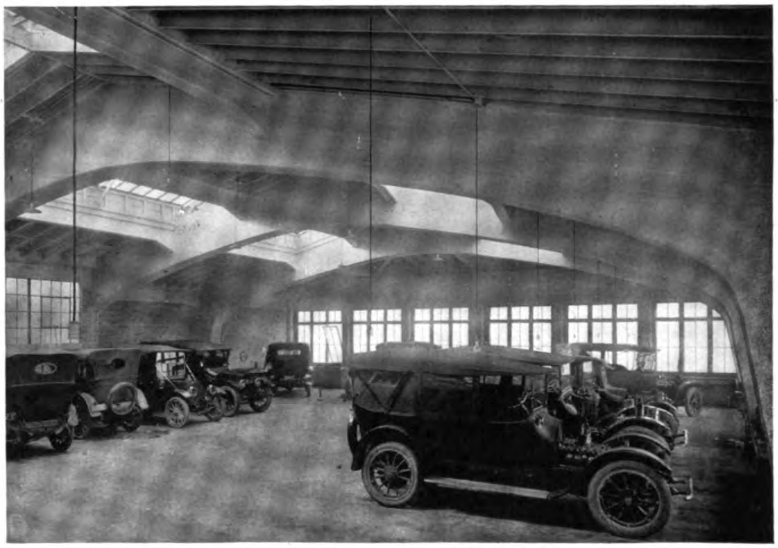
For these simpler buildings concrete is cheaper than bare steel and much cheaper than steel fireproofed. For buildings not heavily loaded, such as schools, office buildings, etc., concrete costs more than light, fire-hazardous wood construction, but less than steel for buildings not over five or six stories in height. For taller buildings with light live loads the added dead load of concrete brings too much load on the columns for economy. The buildings of the Massachusetts Institute of Technology at Cambridge are a fine example of the economical use of concrete in buildings of the better type. The framing of these buildings is the common schoolhouse type with a central corridor and classrooms on each side. For long roof spans (50 feet and over) nothing can compete with the steel truss if second class construction is permissible. For first class construction, or with heavier loads, concrete is usually an economical possibility. In the matter of maintenance, painting, use of glass and such items, which are practically the same for all types of construction, play such a large part that the difference in upkeep cost is not great. Considered as to depreciation, however, concrete is unexcelled; it is the most permanent form of construction known. As



Floor of Buick Building, Washington
An excellent example of simple beam and girder construction
A. W. Brown, Architect

first class construction, concrete of course carries the lowest insurance rate.

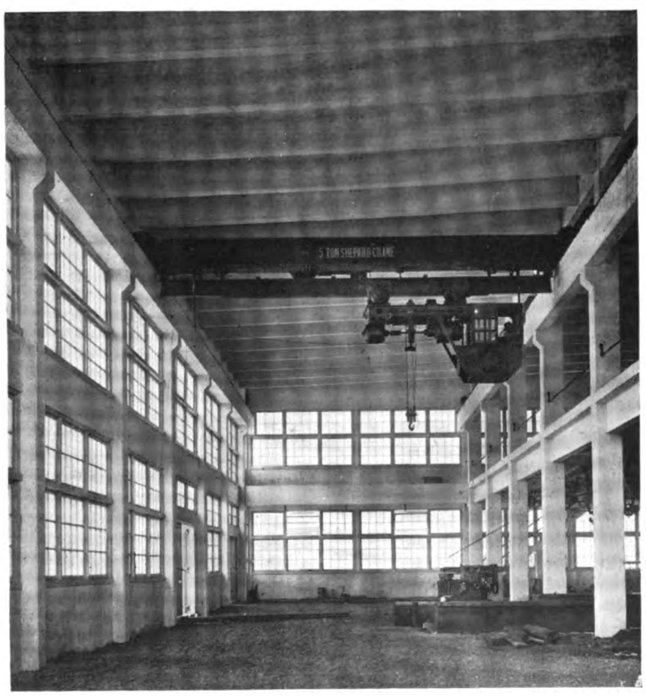
Appearance counts for little in the factory building. Concrete is as amenable to good mass effects as any material. Detailed surface treatment giving an appearance at least equal to that of the usual brickwork can be had at small expense by methods considered in a previous article. By using precast concrete or cast stone the possibilities of surface treatment are unlimited. For interior work, untreated concrete can by the use of good forms be made as pleasing in appearance as any raw material. The better finishes are applied, and the possibilities and cost of applying plaster, paint, etc., to concrete are not far different from applying them to other materials.



Concrete Portal or Rigid Bent. A special type of beam which is economical for first class construction

Miller, Woolley & Evans, Architects. Villadsen Brothers, Inc., Engineers

If properly constructed, concrete is unexcelled in its resistance to fire. City conflagrations have repeatedly proved this. Concrete must be properly designed, however, without yielding to the temptation of cutting down the thickness of fireproofing for the sake of cheapness. Steel properly and completely fireproofed with terra cotta approaches concrete closely in fireproof qualities, but at a far greater expense. Good mill construction of wood is next in value, and exposed steel the weakest in resistance to fire excepting for flimsy wood construction. There is little difference in speed of construction of good sized buildings between concrete and steel or wood. In the field steel can be erected more rapidly, but the time required for fabrication is longer.



An Example of Special Beam Framing

To summarize, concrete excels other materials in permanence and fireproof qualities. For ordinary commercial construction it requires only half as many columns as wood, and it is materially less expensive than steel. With heavy loads it is cheaper than wood construction. Steel costs less only in very tall buildings and where live loads are very light and spans long. In appearance concrete can be made satisfactory for all but monumental work.

There are several types of concrete construction, however, each peculiarly adapted to certain conditions. The slab, beam and girder type is the original form in which concrete was used for floors. Beams and girders are located much the same as they would be in steel construction. It is the most largely used type and is the only one adaptable to all conditions where concrete can be used. With any other system beams are necessary as spandrels and for framing about stairs, elevator shafts and other openings.

A rather special type of beam construction is the long span concrete portal

for roofs. It is used in garages and similar buildings for spans of up to 75 feet where first class construction without columns is required. It is a cheaper construction than a fireproofed truss, and in the shorter spans cheaper than the exposed truss.

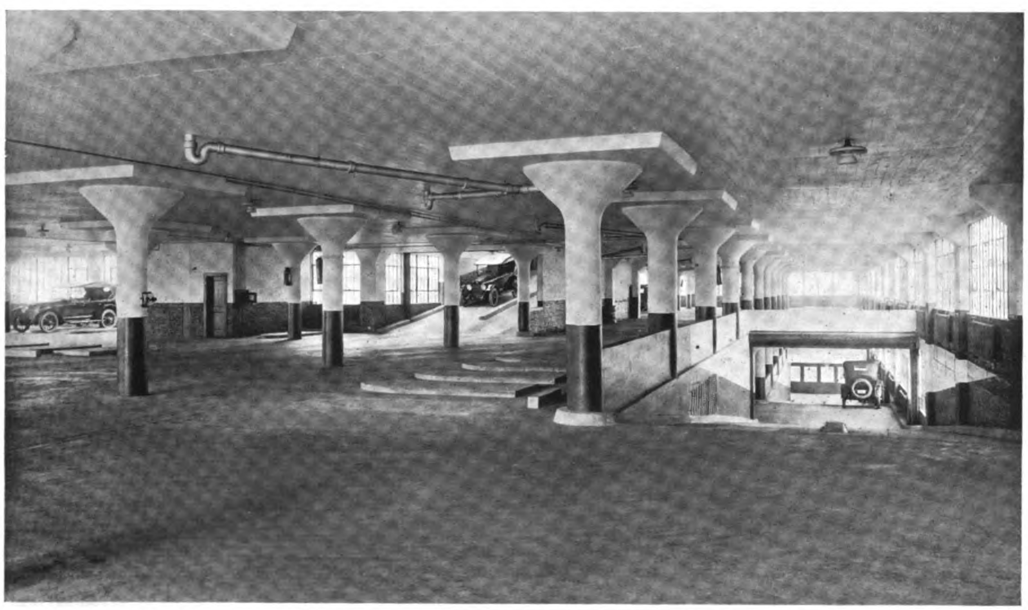
For conditions to which it is adapted, the girderless floor, also called flat slab or mushroom, is unequaled for economy. It also has other advantages and a few disadvantages. The structural conditions under which flat slab floors are at their best are with square bays of from 16 to 30 feet on a side and live loads of 150 pounds per square foot or more. Since the slab rests directly on the spread column heads the ceiling is clear and smooth, which makes for the better distribution of light and heat or for the hanging of pipes or shafting. By placing the spandrel beam above the slab, as is commonly done, sash may extend to the ceiling which is a very great advantage where a deep room is to be lighted. The thinner floor means less height, floor to floor, for the same clear height will often allow 11 stories in a building which would have but 10 with beam framing. Where height restrictions are in force, a 10 per cent addition in rental space is an unanswerable argument in its favor.

The one thing commonly urged against flat slab construction is its appearance. It is primarily suited to large open spaces, and it must be admitted that running partitions promiscuously into large column capitals often produces sad results. Moreover, since the size of the column head is determined by structural considerations and dependent on the column spacing, in the smaller upper story columns the capital is likely to be so large as to be difficult to treat effectively. With the larger columns of the lower stories the head is more nearly in scale and amenable to satisfactory treatment. The Paine Furniture Company's building, one of Boston's newer stores, contains what is a good example of high class flat slab work.

The third common type of concrete construction is the ribbed floor, produced by placing tiles on the form and pouring concrete over and around them so as to make ribs between the tiles and a light slab over them. The top slab is from 1½ to 3 inches thick and the tile from 6 to 12 inches thick, making a total floor thickness of from 8 to 15 inches. Terra cotta tiles are usually 12 inches wide, making the spacing of the ribs 15 to 16 inches on center. Specially formed steel tile are also used in this way, giving a somewhat lighter floor. These are made to give 24-inch centers on ribs. Ribbed floors are used as one-way slabs with parallel beams, or as two-way slabs with a beam system which divides the floor into panels square or nearly so.

One system also makes use of metal tiles to construct a ribbed flat slab floor, in which the entire ceiling is flush with the bottom of the drop panel, this panel itself being solid and the rest of the slab a grid of ribs. These floors are primarily suited to light live loads (50 to 150 pounds) and spans of from 20 to 30 feet or more. Where a flush suspended ceiling is required this form of construction is often lowest in cost.

The one-way terra cotta tile and rib construction is little used and is seldom the most advantageous. There is a two-way tile and rib system which leaves a uniform terra cotta surface for ceiling plaster that is used as a selling point. The beams with this system are usually flat, projecting only a few inches, or



Garage at Wilmington, Del., in Which Typical Flat Slab Construction Is Used
Thompson & Binger, Inc., Architects and Engineers

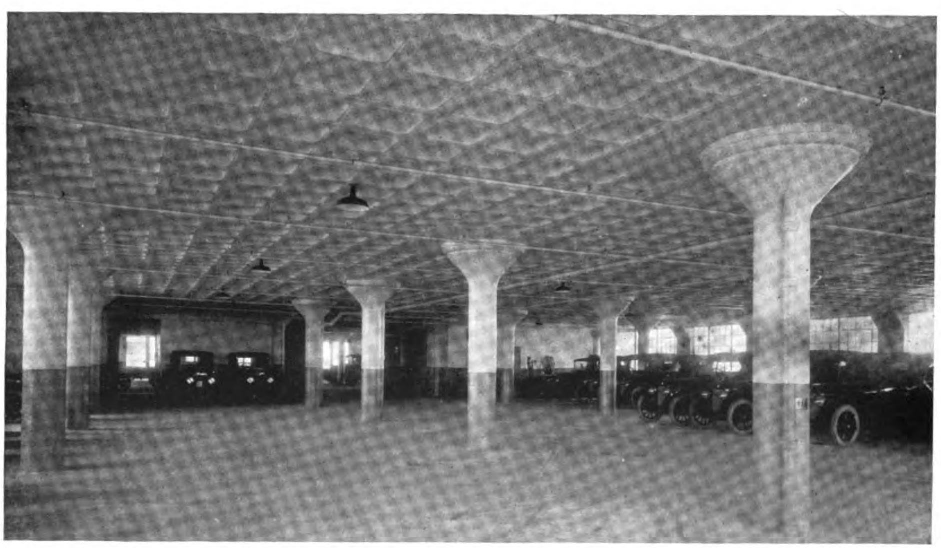
with shorter spans not at all below the ceiling. This system gives an excellent floor which is usually cheaper than structural steel and, including the finished ceiling, is often cheaper than plain beam and slab concrete work.

The metal tiles are used in both one-way and two-way systems. They are lighter than terra cotta tiles where left in the slab, and some kinds are removed with the rest of the forms and re-used. The metal tile is a competitor of flat slab construction for garages and similar buildings where the appearance of the ceiling is of no importance. Where column spacing is irregular the tile systems often offer an economical solution. Where the bays are square and uniform the flat slab type of construction, with or without tiles, is usually the cheaper.

Most types of concrete construction are, or once were, patented. This does not mean much at the present day, however. There is no patent on ordinary beam and slab construction as such. The fundamental flat slab patent has expired, which means that the ordinary two- and four-way systems are free to the world. A few other system patents are still in force. These are designed only by the patentees, who collect fees, usually paid by the contractor, to cover the design and royalty since they do not sell material. These fees are nominal and must of course be less than the saving made in material to make the use of the systems economical. The one-way terra cotta tile system is unpatented. The two-way system is patented, but royalty is included in the price of material which is bought of the patentee. Costs of using such patents as exist in metal tile are covered in the purchase of materials. Deformed rods are in general patented, but the patented type is used simply as a selling point and does not add appreciably to the cost of material.

In considering forms of concrete construction the methods most advantageous for use are easy to determine. A warehouse or factory which can be divided into square bays and must sustain a heavy load is an obvious place for using flat slab construction. A schoolhouse is pretty surely a beam and slab job, with the slab ribbed by the tile in some cases. The type for a garage, department store or office building, on the other hand, may be more difficult to decide. Comparative designs of typical bays must often be made and their relative costs weighed with their other advantages and disadvantages. It sometimes happens that the deciding factor will be the contractor, for he will usually figure more closely on the type with which he and his men have had the most experience. Thus it will sometimes happen that a contractor will offer to reduce his bid by using a certain system on which other contractors would figure an increase in price. Where the general features will permit substitutions, as in most simple work, it is worth while to allow the contractor to make alternate bids even though it involves, as it must, having the substitution checked to insure its being equal in value to the original.

In the press of business details and more interesting architectural planning the matter of structural type does not always receive the attention which its importance to the client's pocketbook warrants. A difference of 10 per cent in the total cost of construction can easily be made by selecting the proper type of framing without any detriment to architectural features. The careful attention of experienced men should be focused on this problem of selecting the type of framing, and this should be done while the other features are being planned and not after their design has been so fixed as to make impossible economical construction, if the client is to receive the attention to his problem which he expects and deserves.



Automobile Service Building Showing Tile Construction (Removable Metal Tiles) Used with Flat Slab Design
A. S. Bowditch, Architect

Plate Description

Town Hall, Tewksbury, Mass. Plates 41–43. Planned with its main portion two stories in height and with wings one story high, this building is an excellent example of the small town hall, particularly when it occupies a plot of considerable extent.

The outer walls are faced with Harvard brick laid in an English bond. The chief details of exterior trim are of white marble, steps are of granite, and the pitched roof of the main portion is of slate. The lobby of the structure is arranged as a memorial to the men of Tewksbury who were lost in the world war. The assembly hall seats 500 and has a stage and balcony, and below is a banquet room provided with complete kitchen and serving equipment and seating 300. In one of the wings is located the village library, while the other wing contains the town offices, vaults, etc., and in the basement are the necessary coat rooms, boiler rooms and the town lock-up. The cubic area of the building is 189,350 feet, and the cost (in 1919) was $64,567, which included all contracts, separate water system and alterations to convert an old stable into an electric generating plant, but which did not include architects' fees.

Group of Buildings at Peterborough, N. H. Town House, Plates 44–47; Peterborough Historical Society Building, Plates 51–54; American Guernsey Cattle Club, Plates 55, 56.

Town House. The massing of the three buildings which compose this group secures for them an importance which adds materially to their interest.

The town house is much the type of building which would have been erected to serve the same purpose in any prosperous New Hampshire or Massachusetts town shortly after the middle of the eighteenth century. Since it stands apart from other buildings, opportunity is given for the free assertion of its architectural character—a slightly restrained handling of the American or colonial version of the Georgian style, such as was widely popular at the time. Material is hard burned selected water-struck brick, with trim partly of limestone and partly of wood painted white. Six tall pilasters with Corinthian capitals upon the main facade support the cornice and pediment, over which is placed an exceedingly graceful and well-scaled cupola. The brickwork of the reveals of the three entrance doors and the windows at their sides is painted white, a fashion which was much followed during the colonial period. The cubic contents of the building are 390,910 feet and the cost (in 1916) 17 cents per cubic foot, without equipment.

Peterborough Historical Society Building. At one side of the town house stands the building of this organization, which has done much to foster the growth of New England traditions. With entire propriety, therefore, is it planned in the same colonial or "American Georgian" style used in the town house, and of the same materials, but with a slight modification as to some of the windows of the lower floor and a suggestion of luxury in the limestone trim about the main entrance. This structure is built about three sides of a square, the local office or exchange of the telephone company occupying part of one wing. A horizontal or "string" course extends around the building, between the windows of the lower and upper floors, which tends to emphasize the low, spreading character of the structure. Since the site of the building is a few feet higher than the sidewalk, a retaining wall of brick and limestone, the materials of the structure itself, has been used with excellent results. The interior is planned with the different rooms likely to be required by a historical society, and certain rooms are devoted to the display of historical relics. Contracts for constructing various parts of the building were let at different times from January, 1917 to May, 1922. The cubic contents are 232,520 feet and the cost 46 cents per foot, without equipment.

American Guernsey Cattle Club. Just across the road from the town house and the historical society's building is the home of the American Guernsey Cattle Club, planned in the same general style of the other units of the group but with some differences in detail. Designed like the historical society's building with wings extending forward from a main structure, its design is marked by the same care and restraint in the handling of its delicate but sufficiently virile cornice, the fluted columns and open pediment of the entrance portico, the wrought iron balustrades and window guards and the carved panels of limestone which are placed between certain windows of the lower and upper floors. This structure was built by day labor, begun in 1917. The cost per cubic foot, without equipment, was 28 cents and the contents 234,612 cubic feet.

Town Hall, Kennebunk, Maine. Plates 48, 49. This unusually interesting example of the small town hall is of a type of architecture which agrees well with its setting in an old New England village, and its pleasing qualities are due to the care which has been expended upon its graceful, symmetrical design and upon choice of appropriate materials.

The grass course and steps are of granite; basement walls are of limestone; upper walls are of water-struck brick, while slate is used for the roof and wood for the cornice, the columns which support the portico, the facing of the main facade under the portico and the cupola which surmounts the building. Here the necessary town offices are placed in the lower or basement story, which is entirely above grade, leaving the entire main floor available for an assembly hall seating 950 and equipped with a stage and a balcony in which the seats are banked. The building is of second class construction and heating is from a one-pipe system with indirect ventilation. This town hall was built during the summer of 1920 at a cost of 30 cents per cubic foot.

EDITORIAL COMMENT

ARCHITECTS' ECONOMIC INFLUENCE

A CLOSER contact with the public and a correct understanding of its service have long been sought by the architectural profession. Occasionally hopeful signs appear that progress in this direction is being made, but it requires only a slight investigation to prove that little of the fundamental principles of the service architects render the public is understood by educated men, or even by those who have knowledge of building and real estate values.

This lack of understanding and appreciation is the greatest handicap to a proper development of architectural influence, and blame for the existing conditions cannot wholly be placed on the public; the architects themselves must accept it. In the efforts that have been made to span this chasm of misunderstanding, architects have always spoken in terms familiar to themselves but incomprehensible to the layman. They have placed themselves in the role of dictators of good taste and created the impression that highly developed forms of beauty come first in their consideration and that if the opportunity for creating such beauty does not exist they have nothing further to offer. It is but natural that this attitude places architecture in the light of a luxury, with the result that this false position has robbed both the public and the profession of untold opportunities.

The opportunities for creating architecture are potentially as great today as at the height of the renaissance, but the methods of procedure are as far apart as the poles. Architecture in the days of the renaissance was produced under the patronage of princely families of great wealth; today its opportunity lies in association with the development of business and civic enterprises. The necessity and desirability of high standards of art in our modern life are unfortunately not universally recognized, and when they are admitted the ability to judge good art is more often than not lacking. Justification of the architect's service on a basis of art value alone is therefore difficult to establish.

But in the perfection of civilization the architect has an even broader and more valuable function to perform than the creation of abstract beauty. Fundamentally he is a planner, endowed with the ability to visualize finished solutions of various problems. In the exercise of this talent lies his greatest public service, and it is this feature of his work that the public knows nothing of.

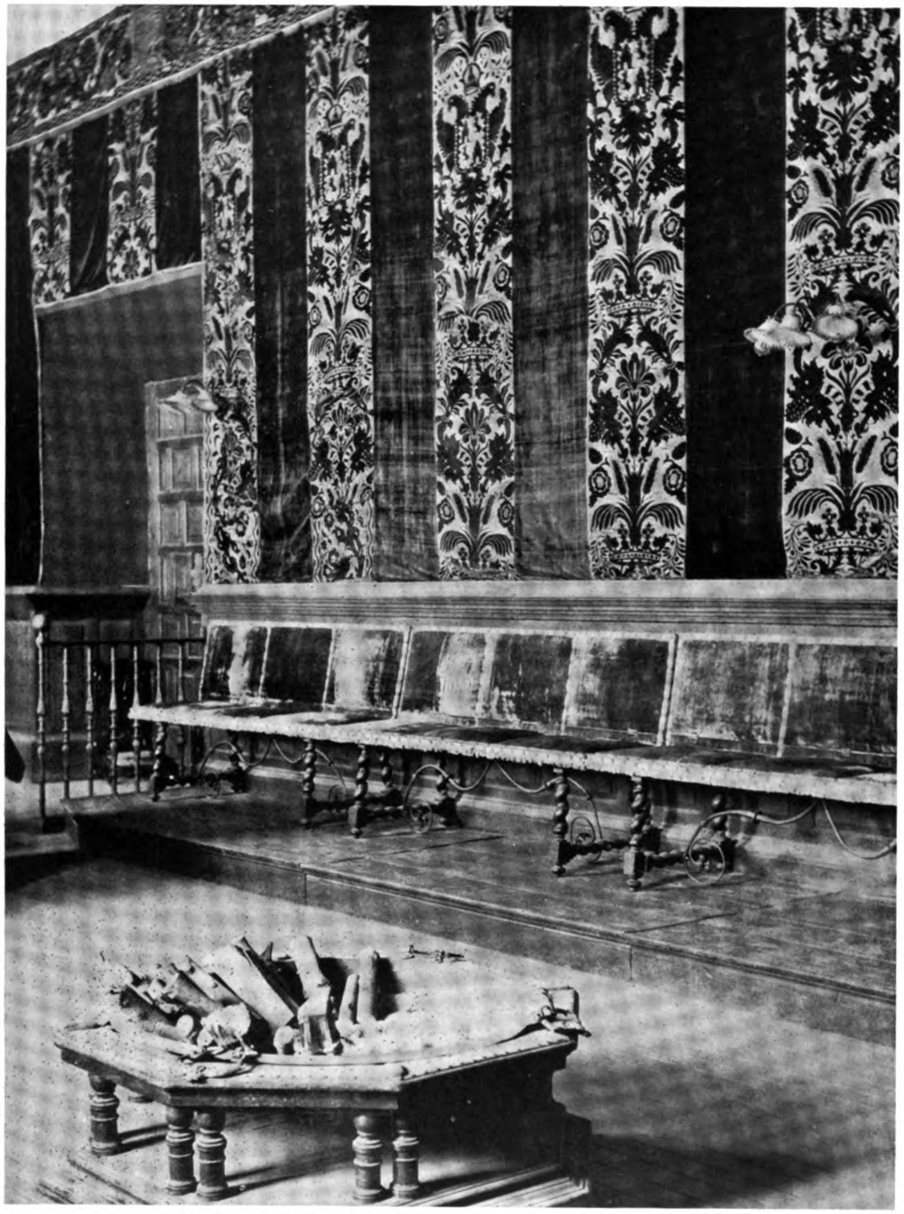
No better opportunity ever existed for proving this ability of the architect than that afforded by present conditions. Building costs are undoubtedly on a permanently higher plane; elements of waste in building plans, improper selection of equipment and lack of care in minimizing maintenance charges that in past years were comparatively negligible factors, have now assumed such importance that the financial success of any building is dependent directly on the efficiency with which these problems have been solved. In the element of planning, therefore, the architect can today prove that he is an economic necessity. He should extend his study in this field to great length; he must know land values and the economic relations between them and building types; be able to anticipate the direction of future growth so that the successful use of his building can be assured even under conditions different from those prevailing when it was built. He must be familiar with costs of operation and rates of depreciation for standard types of buildings so that his contact with the development of a building program may be continuous from the start of operations. With all this he needs to realize the very great importance of financing and the vast influence that is exerted on building plan and construction through the sources of building loans. It is a singular fact that many loaning institutions give but slight consideration to the character of construction or the quality of the plan of a building on which they loan funds, and it is reasonable to suppose that if a keener sense of the influence of plan in hastening or retarding building obsolescence were possessed by the officials of loaning institutions and by bankers, more stable real estate values could be enjoyed. Architects should therefore lose no opportunity of pointing out to bankers the value of good planning as an insurance factor in building loans and of advocating the establishment of regular inspection departments within loaning institution organizations in which men of broad architectural planning experience will study plans presented for loans for their economic value.

The architect's planning ability extends beyond the single building; it includes the grouping of related buildings and even the essential features of city planning. The opportunity for public service in this phase of planning is constantly arising in our cities because of rapid increase in population, expanding business districts and cramped arteries of communication resulting from the astounding increase in automobile traffic.

Let architects take an active interest in these problems and demonstrate in the opportunity thus offered the value of the service they can render, and the public will be quick to recognize its importance.

DECORATION *and* FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS



Walls hung with sixteenth century velvet, a plain surface alternating with another of bold figure; walnut benches covered with velvet. The decorative value ot this room is due almost entirely to the successful use of textile fabrics.

From " Spanish Interiors and Furniture "

A Plea for the Architect's Interest in Fabrics

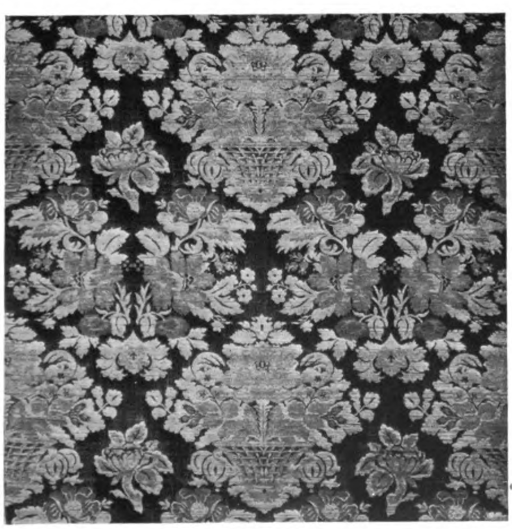
By HORACE MORAN, INTERIOR DECORATOR

SURFACE texture will decide the fate of any building material that might be considered in architectural design. It is a vibrating quality that is the overtone, playing all through the composition, adding interest to form and color and even creating the latter through the varied influence of light.

Textile fabrics, being all of a plane, must depend much upon this quality in their appeal to the eye, and weavers therefore have for centuries sought ways of employing the thread to create interesting surface. In addition to varying the direction of the thread and its thickness, the weavers secure texture by the use, separately or in different combinations, of two animal, two vegetable and two mineral threads. The silk and the wool offer the richest and most sumptuous of textures as in the damasks, brocades, velvets and taspestries. The flax and cotton are more durable and yet are refreshing and cheerful and make a simple direct appeal, being devoid of the subtle luster and richness of the animal threads. The two mineral threads, gold and silver, employed usually to embellish the silk weaves, are rarely used alone in the whole fabric and are, of course, too costly to employ with the more modest vegetable threads. Other groupings of threads are used, as for example, copper with cotton to simulate the silk and gold fabrics. Other natural fibers are at times employed, but need not be considered in this brief article. Furthermore, all the threads mentioned may be used in different combinations, either to enhance the effect of the cheaper, to lessen the cost of the richer weaves, to give strength to the fabric or to reduce the luster. The designing of textiles at all times has been governed by the same tribal or national influences that have controlled architectural and all other applied design. Man always did and always will weave, and this of all the arts perhaps has most universal application. Just one more thought before we consider the weaves made today for decorative uses. Most other materials at the service of the architect are stationary, fixed in permanent, rigid positions. Textile fabrics, when used as wall decorations, upon the contrary, owe much of their value to the fact that they are hung from above, the surface often falling with a slight fullness that affords play for light and shadow. It is this that gives the animated effect to a tapestry-hung interior which would of itself present but stolid, inert walls.

The architect, now that his engineer is relieving him more and more of many technical problems of modern building, is showing an increased interest in the decoration of the interior. It is hoped he will in the future find much to interest him in the decorative possibilities of the many textures at his service in the field of textiles. The kinds of woven fabrics are few in number and readily distinguished, but the varieties and the names used to identify them in the trade are hundreds in number and ever increasing as the manufacturers strive to gain attention by novel creations. An

Detail of Brocade Shown Below



Duppione Silk Brocade

Remarkable chiefly for its curious weave. The figure is made of a peculiar lumpy silk on a dull satin ground

Silk and Metal Damask

The design in satin is thrown out against a metal background, which is moiré to soften the effect

Figured Linen Velour
Design in cut and uncut, in two colors and two heights of pile on a ribbed background

Figured Silk Velvet
Reproduction of old weave showing one height of pile on worn-out satin background

understanding of the basic types of weave is soon acquired by a study of the collections of examples at any one of several museums, such as the Metropolitan Museum of Art or the Cooper Museum, both of New York. Museums of other cities are also gradually offering opportunities for this study. A number of excellent works have appeared in France, England and Germany, as for instance the thorough volume on the history of decorative silks, by Otto Van Falke. "Decorative Textiles," by George Leland Hunter is an interesting cataloging of textiles in detail, and the text shows much research into the literature of the subject.

A more direct way for the architect to crystallize in his mind the whole subject would be to visit one of the well known wholesale dealers in decorative fabrics and

Detail of Damask Shown Below

Silk and Linen Damask
In this weave the effect of metal is artfully obtained by use of a silk thread twisted on a thread of linen

ask for a showing of the various kinds and an explanation as to why some are serviceable for hangings and upholstery and others only for hangings. He could learn of the possibilities of fabrics, the very existence of which was unknown to him.

He could learn how patterns he wishes to use may be woven in colors not carried in stock, or how certain stock colors of one fabric may be used for other weaves of patterns. The manufacturer craves the co-operation of those æsthetically interested in fabrics; all through his commercial life there is a longing to improve his output, and that longing is but too little understood or encouraged by the artist. In the inner sanctums of these large establishments are groups of enthusiasts who revel in the discovery of some new ex-

pression of their art or in the success of some new trial of weaving or printing on cloth, much as do the architects upon the discovery of some new motif unearthed at Sardis or the finding of an unusual wall surface in some little hill town of Italy.

This article is illustrated with examples of the more useful decorative fabrics and printed cloths of today, which show at a glance the superficial effect of using the various threads, but only the actual handling of large lengths of the fabrics will reveal the decorative value of each and show how misleading is the practice of judging a weave by small cuttings or bits of pattern. Perhaps it is unnecessary to remind the architect, accustomed as he is to judging the materials he employs only by trials *in situ*, that the decorative effect of a fabric is subject more than that of any other material to the influence of the light and the adjoining colors and textures of its intended surroundings. An evil practice, much too common with those selecting fabrics, is to send untrained assistants to select "cuttings" at the dealers'. A lesser evil is to judge a larger length of fabric away from its intended setting, since only by long experience can even fair results be gotten by such a method. As has just been said, and it bears repeating many times, no fabric will reveal its appropriateness away from its destined setting.

The cataloging of things is an uninteresting theme, but for an understanding of this subject it must be resorted to and can very properly begin at this point. Of the three principal silk weaves damask is the most universal, and it is the material referred to by writers when they mention silk hangings. It is a flat textile, all on one plane, and although entirely of one color (or usually so) the design is produced by the direction of the background and the pattern threads which are woven into one another at right angles. Damask may be made with quite intricate and small patterns, but it is at its best in the great, bold forms which are characteristic of the period of the renaissance.

Brocades are ornamented damasks, produced by weaving on the usually one-color damask ground added patterns in colors. This might be regarded as a form of embroidery which, on the already interesting play of pattern, presents a wealth of lustrous design and color.

Velvets depend for their effect upon the projecting surface threads, giving an element of depth or thickness to the material. These threads may rise from the ground and return, forming an infinite number of loops, or the top of each loop may be cut, thus forming a pile surface. Variations of this result from cutting some of the threads and not others, so as to produce a design, or projecting the threads to different heights, forming two or more planes and thus adding to the intricacy of the design.

The splendid use of wool in tapestry has resulted in a fabric of the greatest endurance and the most interesting perhaps of all the products of the loom. The word may be applied to all simple weaves in which firm warp vertical threads are entirely engaged by the soft wool weft so that the warp is not exposed but asserts itself by giving a ribbed texture to the weft. This noble fabric, which has come down the centuries, being made on a hand loom and usually confined to the presentation of a woven picture, is a stately production and of great value for decorative use. The machine loom has made a heroic effort to approach the effect of the handmade

Handmade Woolen Tapestry
A very heavy fabric of interesting texture; design taken from an old Gothic tapestry

tapestry, but its success can readily be judged by a comparison of the two.

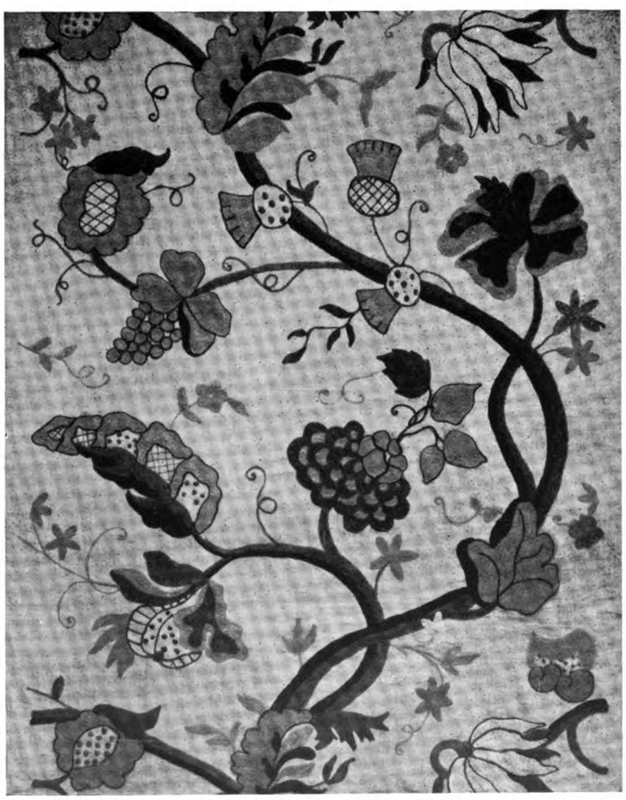
Linen and cotton fabrics are many in weave, and the illustrations suggest their varied character. These two materials are also commonly used as a ground for design printed in color, and when so treated form the group which is made up of chintzes or cretonnes.

There is a group of fabrics made by applying with the needle upon a plain ground a design made to conform to a given space. This includes embroidery, *appliqué*, needlework (*gros point* and *petit point*) and crewel work. Nothing has been said of laces and carpets, although these are both textile fabrics. They are so distinctly apart from the type of fabrics under consideration, however, that it is not necessary to more than mention them.

As to the decorative uses of textile fabrics, it is known that they are hung upon walls, they curtain window and door openings, form the surface covering of seats, are used for the hangings of bedsteads, cover pillows and cushions, and once were even used for bell pulls. What is perhaps not so well known is the art of selecting a fabric to produce a desirable decorative effect. It might be to enhance the color or interest of a room or to introduce a texture or surface of design in an otherwise cheerless place. Fabrics may be used not to introduce color or additional ornamentation but to increase the area of a color already in place. It is a matter of common observation that no matter how well designed an interior may be, it remains hard and cheerless until the introduction of an element that yields to the touch and by its appearance tells that it is not a part of the structure but a live texture, bearing color and design. That element is the textile fabric, the use of which dates as far back as the history of man, and makers of such fabrics in this country today are producing much that commands the attention of all who have to do with interior design.

Only those familiar with the products of modern textile manufacturers have any idea of their value. Reproductions are being made of the fabrics of many countries and centuries, produced by machinery, it is true, but possessing much of the character of hand-woven textiles, and this makes possible a varied choice.

Detail of Velvet Illustrated Below



Embroidery on Homespun Linen
Machine-made embroidery in imitation of old crewel work

Chintz Colored Figured Silk Velvet
Figure in colors in two heights of pile on satin background

SERVICE SECTION
of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

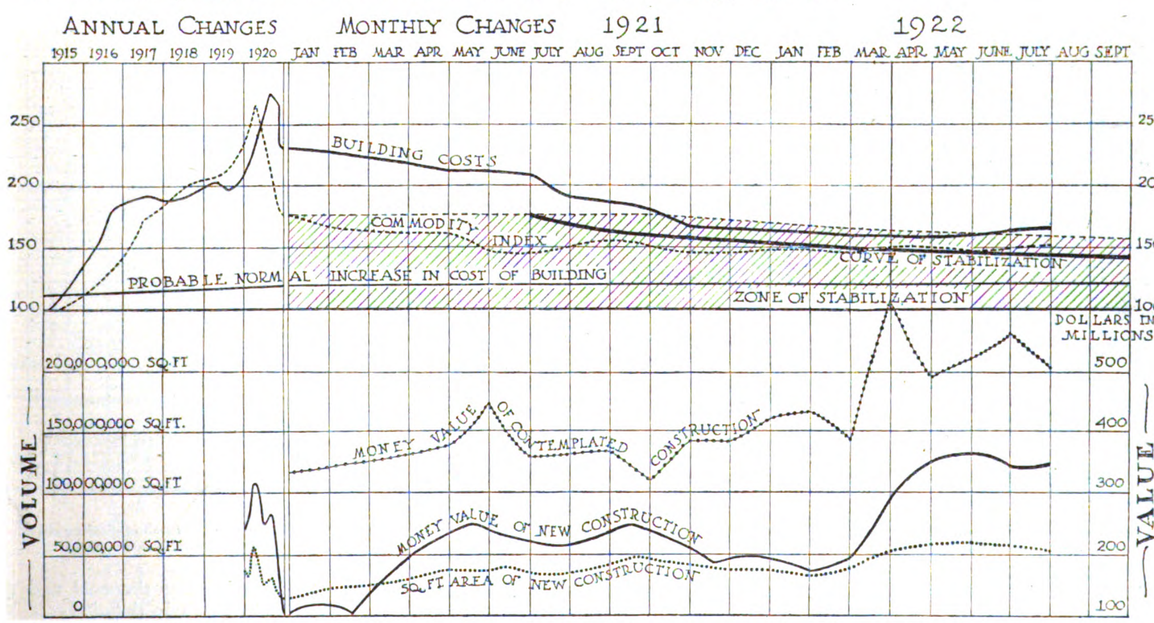
The Building Situation

FIGURES now available for the month of July show that the volume of construction activity was well maintained through the summer months. A study of the chart presented here indicates a natural drop in the line of contemplated construction. This was due to seasonal conditions and to the cutting down of speculative building because of a continued advance in building costs.

Expenditures actually contracted for in the building field held up well toward the peak of this year and at a rate considerably higher than normal. The relative position of the line showing square feet of new construction indicates that activity is continuing in approximately the same classes of buildings.

It will be noted that the cost of building continues to rise, and that this line is practically paralleled by the general cost of living as represented by the commodity cost line. This is a natural reaction, not only to the heavy demand for materials and labor earlier in the year, but as a general result of a greater volume of business in all industries.

In regard to types of new construction, there seems to be a trend away from speculative and residential, with an increase in the volume of public and institutional work. It appears strongly that we are now in the beginning of the predicted second wave of building activity, to be composed of larger and higher class units, such as public and institutional buildings. The fall finds architects generally busier than for many years, and this gives ground for optimism. Excepting for some artificial or incidental restriction it would seem that building activity would continue strongly. For many years there have not been available such large sums of mortgage money, and the confidence of the investing public in buildings as collateral seems to have been strongly asserted.

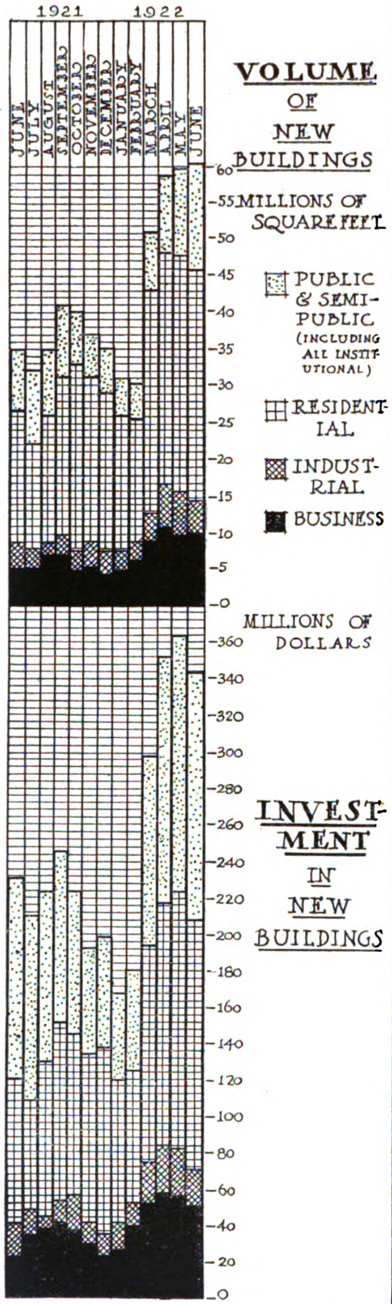


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812: (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.

Lumber
Price trend line based on soft wood price index presented by *Lumber*. This indicates price variation of yellow pine, Douglas fir, hemlock, N. C. pine, white pine, cypress and spruce

Steel
Structural shapes
Price per 100 lbs.

Reinforcing bars
Price per 100 lbs.

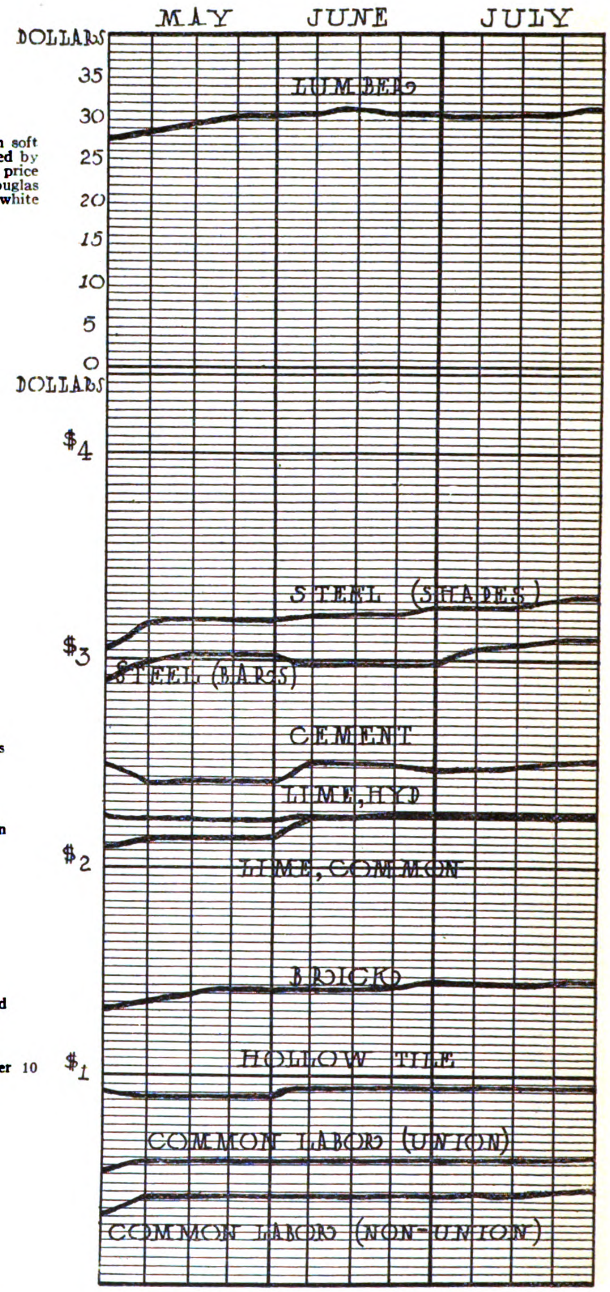
Cement
Price per bbl. without bags

Lime
Finishing
Hydrated, price per 1/10 ton
Common lump
Price per bbl.

Brick
Common, per 100 delivered

Hollow Tile
Partition, 4 x 12 x 12, per 10 blocks

Common Labor
Union
Rate per hour
Non-union
Rate per hour



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in the prices of a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line as shown on the preceding page.

The volume and investment chart indicates that construction activity, as the result of contracts let in June, will decrease somewhat in the industrial classification, increase slightly in business and institutional building, and maintain approximately the same level in residential work.

The material field is showing a stiffening of prices. A slow but steady average increase developed during the summer which was the result of the heavy market developed in the first few months of this year. During the months of July and August the effects of the coal and rail disturbances were felt definitely in the building field and have added somewhat to the upward trend of the line of building cost as shown on the first page of this section.

It may be predicted that the fall season will show some reduction in the volume of residential construction because of seasonal conditions and because of the slackening of speculative building as the housing demand eases and costs increase.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of July 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitch-burg	Mass. Haver-hill	N. Y. Buffalo	Penn. Pitts-burgh	Penn. Erie	Md. Balti-more	Va. Rich-mond	W. Va. Fair-mont	S. C. Colum-bia	Fla. St. Pe-tersburg	Ga. Savan-nah	Mich. Lansing	Mich. Pontiac	Mich. Bay City	Wis. Milwau-kee	Iowa Water-loo	Iowa Des Moines	Iowa Cedar Rapids
Common Brick		1,000	*$19.00	$20.00	$17.12	$16.00	$15.75	$18.00	$14.00	$19.30	*$12.00	$17.00	$13.50	*$13.00	$14.40	$14.00	*$11.50	$14.90	$16.00	$14.80
Portland Cement	Excl. of containers	Bbl	*2.75	2.90	2.36	2.50	3.00	2.85	3.40	2.34	*3.50	3.20	3.50	*2.50	2.29	2.21	*2.45	2.36	2.12	2.39
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	50.00	.....	39.00	25.00	45.00	.....	35.00	25.00	45.00	36.00	45.00	.....	33.00	44.00	43.00
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*40.00	36.00	44.00	.....
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	25.00	35.00	*22.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	*39.00	38.00	.....	47.00	.....	.....	32.00	47.00	*20.00	.....	.....	40.00	40.00	38.00	*38.00	36.50	42.00	35.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	.....	.....	.....	72.00	.....	125.00	70.00	72.00	.....	70.00	.....	70.00	.....	.....	.....	96.00	.....	86.00
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	96.00	95.00	.....
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	6.60	6.00	5.04	5.50	.....	.....	.....	*6.00	8.00	.....	6.00	5.75	6.00	*6.00	7.50	6.00	6.00
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	7.00	.....	.....	7.25	*6.00	.....	.....	.....	.....	6.50	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	*6.25	8.00	.....	.....	7.00	.....	6.00	5.50	*6.25	8.00	6.50	.....	5.70	6.00	.....	7.75	.....	6.50
Gypsum Plaster Board	3/8"	1,000 sq. ft.	.....	45.00	45.00	37.50	50.00	25.00	40.00	25.35	*35.00	.....	40.00	35.00	23.93	45.00	*40.00	32.00	35.50	40.00
Lime	Hyd. Com.	Ton	*20.00	20.00	18.00	20.00	19.00	15.00	15.00	13.00	*20.00	.....	22.00	18.00	13.70	18.00	*18.00	20.00	27.50	18.00
Building Sand		Cu. yd.	*1.80	2.50	1.28	2.50	2.50	2.00	2.20	2.40	*.95	4.50	2.00	2.00	1.50	2.50	*2.25	1.50	.60	.90
Crushed Stone	3/4"	Cu. yd.	*3.71	3.00	1.62	5.50	3.00	.....	3.00	4.50	*3.00	6.25	5.00	.....	1.48	3.75	*2.25	3.00	3.00	2.36
Window Glass	Single A 10"x12"	50 sq. ft.	*5.00	4.00	3.90	2.80	.....	3.60	3.50	3.80	*4.80	.....	.....	5.40	.....	5.15	.....	6.00	4.50	.....
Hollow Tile	8"x12"x12"	Each	*.22	.22	.20	.20	.18	.21	.16	.19	*.15	.20	.....	.17	.17	.16	.....	.13	.....	.14
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	58.80	55.20	.....	74.00	50.00	50.00	*48.12	.....	.....	50.00	52.00	51.00	.....	45.00	87.20	.....
Steel Pipe	1" galv.	100 ft.	.....	9.50	10.00	7.82	.....	7.95	7.50	7.50	*9.52	12.00	.....	.....	8.50	9.50	.....	9.57	9.37	.....
Reinforcement Bars	3/4" square	100 lbs.	*2.65	2.40	.....	2.47	.....	2.70	2.25	2.15	*3.50	5.50	3.10	2.50	2.40	2.30	*3.00	.....	2.68	3.00
Structural Steel	Fab. 6" I-beams	100 lbs.	*3.25	4.00	*3.20	.....	.....	.....	3.75	3.50	*4.00	.....	3.10	2.75	.....	3.10	.....	3.20	2.88	4.20
Gypsum Plaster	Neat	Ton	.....	21.00	13.50	22.00	24.00	.....	18.00	14.90	*20.00	.....	.....	.....	.....	15.00	*13.00	13.60	13.50	16.50
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	8.00	13.50	.....	.....	12.00	13.50	.....	.....	.....	17.50	17.10	17.00	.....	20.00	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	.....	2.40	2.00	1.95	2.15	.....	2.25	.....	*2.25	.....	1.90	2.50	2.75	2.75	.....	.....	2.63	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	.....	1.50	1.05	1.20	.85	1.25	.95	1.00	*1.00	1.25	.75	.75	1.00	1.00	.....	.....	1.08	.....

*Delivered at job

Commodity	Size or Condition	Unit	Iowa Council Bluffs	Mo. St. Louis	Mo. Kansas City	Ill. Chi-cago	Ohio Cleve-land	Ohio Akron	Ohio Dayton	Ohio Cincin-nati	Ohio Toledo	La. Shreve-port	Texas San Antonio	Ariz. Tucson	Wash. Spo-kane	N. Dak. Grand Forks	S. Dak. Aber-deen	S. Dak. Sioux Falls	Calif. San Francisco	Calif. Sacra-mento
Common Brick		1,000	$17.50	*$16.35	$16.50	$11.00	*$15.00	*$15.00	*$17.00	*$17.00	.....	*$15.00	$13.00	$10.00	.....	$14.00	$16.50	$15.50	$15.50	.....
Portland Cement	Excl. of containers	Bbl.	2.44	*2.60	2.45	.....	*2.84	*2.56	*2.68	*2.59	*$3.08	*3.50	3.00	4.10	.....	2.55	2.60	2.70	2.63	$3.50
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M	40.50	*42.00	43.50	37.00	*53.00	*45.00	*45.00	*44.00	*46.00	*43.00	45.00	.....	.....	.....	.....	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M	39.50	*40.50	43.50	.....	.....	.....	.....	.....	.....	.....	.....	55.00	.....	.....	40.00	46.00	31.00	34.00
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	38.50	*45.00	.....	31.00	.....	*45.00	.....	.....	.....	*48.00	48.00	50.00	.....	.....	35.75	41.00	31.00	33.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M	.....	*66.00	.....	.....	*87.00	*115.00	*90.00	*95.00	*75.00	*78.00	75.00	.....	.....	70.00	.....	84.00	.....	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92.50	$70.00	.....	75.00	81.00	67.00	75.00
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	6.00	*5.97	*5.00	.....	*6.20	*6.50	*5.20	*5.04	*6.00	*6.07	7.00	.....	.....	.....	5.00	5.10	4.60	4.75
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	*6.97	.....	6.50	.....	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	8.00	*6.00	5.80	.....	*6.25	.....	*6.00	*5.75	.....	*6.93	.....	.....	.....	5.50	8.00	7.50	9.75	.....
Gypsum Plaster Board	3/8"	1,000 sq. ft.	.....	*39.50	32.00	.....	*53.00	.....	*32.50	.....	*40.00	*45.00	52.00	55.00	.....	36.00	32.00	32.00	.....	.....
Lime	Hyd. Com.	Ton	17.85	*23.20	25.60	14.70	*14.80	15.00	*14.00	.....	*18.00	*27.50	22.50	15.00	.....	18.00	19.00	24.00	20.00	29.00
Building Sand		Cu. yd.	3.50	*2.56	2.50	2.25	*2.50	*1.75	*1.80	*2.23	*3.04	*2.00	2.75	1.15	.....	2.50	2.00	.....	1.50	1.25
Crushed Stone	3/4"	Cu. yd.	5.00	.....	2.75	2.25	*3.50	*3.25	*2.50	*2.25	.....	*5.00	2.60	3.00	.....	6.50	3.70	.....	2.50	2.75
Window Glass	Single A 10"x12"	50 sq. ft.	.....	*3.90	4.50	.....	.....	*4.20	*4.50	.....	4.20	*4.50	5.40	5.40	.....	.....	5.00	.....	3.75	4.22
Hollow Tile	8"x12"x12"	Each	.09	.....	.22	.....	.....	*.16	*.18	.....	.....	*.25	.21	.18	.....	.....	.13	.....	.18	.....
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	.....	.....	*65.00	.....	.....	*77.00	59.00	.....	.....	.....	.....	.....	.....	.....
Steel Pipe	1" galv.	100 ft.	.....	.....	.....	.....	.....	*8.36	*8.57	.....	.....	*9.40	9.40	11.25	11.03	.....	.....	.....	9.90	9.90
Reinforcement Bars	3/4" square	100 lbs.	3.05	.....	2.90	.....	.....	*2.85	*3.00	.....	.....	*4.00	3.75	4.50	.....	3.42	3.73	3.50	.....	3.05
Structural Steel	Fab. 6" I-beams	100 lbs.	3.45	3.75	3.75	.....	.....	.....	*3.25	.....	.....	*4.00	.....	.....	.....	.....	.....	5.00	3.90	4.30
Gypsum Plaster	Neat	Ton	18.00	*19.50	15.50	.....	.....	*16.30	*19.00	.....	.....	*24.00	24.00	23.00	.....	.....	18.00	15.40	14.80	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	.....	*10.75	*16.50	.....	.....	*12.00	.....	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	3.50	.....	.....	.....	*2.50	.....	*2 25	.....	.....	*2.60	2.53	3.25	.....	2.60	2.10	3.00	.....	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.50	*.74	1.20	.....	.....	.....	*1.15	.....	1.30	.....	1.80	1.50	.....	1.25	1.00	.....	2.00	.....

*Delivered at job

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A group of nationally known experts on various technical subjects allied to building, providing a direct service to architects

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(b) That no Committee member has affiliations with any manufacturer;
(c) That no Committee member will be called upon for detailed service excepting by special arrangement;
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Address inquiries to committee members, care THE ARCHITECTURAL FORUM, 103 Park avenue, New York

THE FORUM DIGEST

A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

WHY BUILDING COSTS ARE ADVANCING

SINCE June, 1920 the construction cost curve has declined steadily. The heaviest drops from one month to the next were during January, 1920 and October, 1921. The latter drop—16 points or 9 per cent, according to *Engineering News-Record's* Cost Index Number—pictures the final slump of the steel market and labor deflation, and was the last important decline to be recorded. Since then cost has been about the same from month to month, even creeping up.

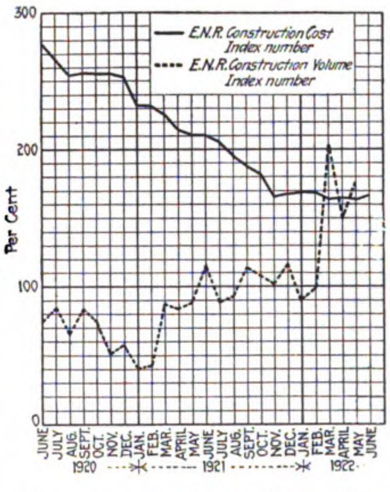
Prices are stiffer, and there is a growing feeling that they may rise generally. Warrant for this feeling may be found in a study of the accompanying chart, in which the *Construction Cost Index* (CC) and the *Construction Volume Index* (CV) are plotted to the same scale. The CV Index shows the rate at which contracts are being awarded compared with 1913 activity. From June, 1920 to June, 1921 the average monthly rate (70 per cent) was 30 per cent lower than in the year before the war—and 1913 itself was a subnormal construction year. On the other hand the average rate for the last 12 months has been 122 per cent, which is 22 points greater than for 1913 and 74 per cent higher than for the preceding 12 months.

Confidence began to return to the construction industry with the opening of 1921. This is clearly reflected in the jump of the CV Index from 43 to 88. By May the 100 per cent level had been reached, activity being equal to the average 1913 rate. This general level was maintained during the rest of the year. Only minor ups and downs of the curve appear during this period.

The abrupt increase in contracts let in February, 1921, followed by a continuance of this higher volume rate, began to show visible effect in November, 1921—10 months after the first impetus. Construction cost climbed slightly. It settled back during February, 1922, but the rise was resumed in March, and the advance since then has amounted to about 4½ points, or nearly 3 per cent.

It is plain that the second great impetus of the last two years—beginning with 1922—has not yet had anything like its full effect upon prices of construction materials. It is not likely that the experience of the first impetus will be repeated in the second instance, and that 10 months will pass before prices react to promised increased demand. There was a reason for this 10-month period in 1921. It would have been a difficult feat to have stemmed the 1920–1921 decline in cost, even if anyone had wanted to do so. Prices had to come down, and only a practically impossible call for materials and labor could have kept them up.

Therefore, even with the increasing prospective demand for materials, prices and labor rates continued to decline until balanced by actual ordering of materials for the new construction. As stated, this steadying took place beginning November.



The construction impetus initiated last January by the final price drop is already beginning to stiffen prices and labor rates. Steel and cement are firm. Brick, on the other hand, is jumping upward in a most unhealthy manner. Lumber is rising generally. The average rate paid common construction labor is slightly higher than a month ago.

Obviously, then, construction cost is due for an increase; how much and for how long cannot be predicted. It is easily conceivable that steel—the material hardest hit in the slide from the peak—may return to $1.75 per 100 lbs. for structural shapes. Last fall the feeling was quite general that this would have been a workable price. As there was practically no actual demand for steel at the time, the market continued to weaken until steel could be bought at $1.30. Future prices of cement depend largely upon the coal situation. Adding $2 to the price of a ton of coal at the mines increases the cost of cement 20c. per bbl. Prices elsewhere are generally steady. Brick prices are already out of reason, but with continued demand and insufficient production there is nothing to prevent still greater inflation.

What will be this increase in construction cost? A guess that would be as good as the next would be 5 per cent.

MEN EMPLOYED IN CONSTRUCTION INDUSTRY

IN the course of discussions regarding the building labor situation it is often of interest to know the number of men engaged in the various building trades. A recent investigation by the Associated General Contractors provides this valuable information.

This tabulation shows the average number of members in good standing in 1922:

Asbestos Workers, Int'l Ass'n of Heat and Frost Insulators.....	2,100
Bricklayers, Masons and Plasterers' Int'l Union of America	69,999
Bridge and Structural Iron Workers' Int'l Ass'n..........	16,000
Carpenters and Joiners, United Brotherhood of..............	313,000
Electrical Workers of America, Int'l Brotherhood of..........	142,000
Elevator Constructors' International Union..................	3,846
Engineers, Int'l Union of Steam.	16,000
Granite Cutters, Int'l Ass'n of....	10,250
Hod Carriers, Building and Common Laborers' Int'l Union.....	46,002
Lathers, Int'l Union Wood, Wire and Metal..................	8,001
Marble, Slate and Stone Polishers, Rubbers and Sawyers, Tile and Marble Setters' Helpers, I. A..	1,568
Metal Workers, Int'l Alliance Amalgamated Sheet..........	24,999
Painters, Decorators and Paperhangers, Brotherhood of......	99,274
Plasterers, Operative and Cement Finishers' Int'l Ass'n.........	24,715
Plumbers and Steam Fitters, United Association of................	35,000
United Slate, Tile and Composition Roofers, Damp and Waterproof Workers' Association....	3,000
Stone Cutters' Ass'n, Journeymen	4,602
	821,156

Nearly 2,500,000 in Trades

Information in regard to the total number of men engaged in the building trades is in an unsatisfactory condition. This tabulation, based on figures from the 1920 census, shows a total of nearly 2,500,000 men in the building trades:

Brick and Stone Masons........	131,257
Carpenters.....................	887,208
Cement Finishers..............	7,621
Electricians....................	212,945
Painters, Glaziers and Varnishers (building)...................	248,394
Paperhangers..................	18,338
Plasterers.....................	38,249
Plumbers and Gas and Steam Fitters	206,715
Roofers and Slaters............	11,378
Stone Cutters..................	22,096
Structural Iron Workers (building)	18,836
Coppersmiths..................	5,232
Tinsmiths and Sheet Metal Workers	69,725
Laborers, building, general and not specified....................	608,075
Total.....................	2,486,069

The difficulty with this table is that it does not include all of the building trades and that it does include under some of the items considerable numbers of men not engaged in building. In some of the groups, particularly carpenters, plumbers and steam and gas fitters, and electricians, men are included who are employed in shops and not in building construction. The item for electricians is particularly misleading as it includes automobile electricians, a large variety of men engaged in electrical manufacture and apparently some of the line men. The item of laborers is very unsatisfactory as it includes a class entitled "general and not specified," which means that this group has been used as a dumping ground for all laborers, the exact nature of whose work was not indicated on the census returns.

REPLACEMENT OF BUILDING TRADES WORKERS

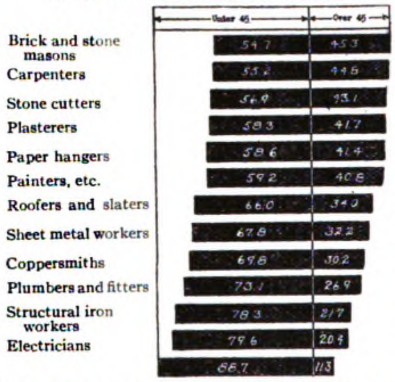
THIS article and the accompanying charts are reproduced from *Index:*

"How many new workers are needed each year in the building trades? That question is of fundamental importance to a rational study of our needs in the fields of apprenticeship and trade schools. New workers are needed for three purposes: to take the places of those who die, of those who retire, and to provide for the increases which should accompany a growing population. It is evident that the number of deaths and retirements, in any trade, will depend largely upon the ages of the men engaged in that trade, for old men die faster and retire sooner than younger men. Diagram I shows the number of people engaged in 13 of the building trades and their distribution by age periods, according to the 1920 census.

"The figures given should not be used without reservation as representing the number of workers engaged in building construction, because the census classifications are such that many of those included in some of these groups are working in factories or in other pursuits not connected with the erection of new buildings. With this reservation in mind, however, they may be satisfactorily used for the purposes of the present study.

"The bars in Diagram II show what proportion of the men in each of these trades are over 45 years of age, and what proportion are under that age. It is obvious that the men at the head of this list must be dying off much faster than those at the foot. Those trades which show the greatest proportion of younger men are those which have been recruited largely from young men in recent years. Those with the greatest proportion of older men are the trades which have been receiving relatively few additions from among the youths. The latter are trades whose numbers have been growing slowly or even decreasing, while the former are the rapidly growing trades.

II. AGE TABLE OF ARTISANS

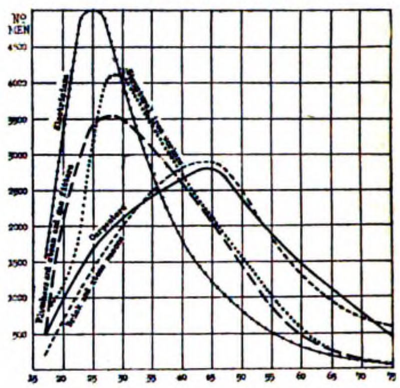


Percentages of men in the building trades who are over and under 45 years of age

"It is unfortunate that the figures at present available from the census bureau do not give us a more detailed age distribution. It would be much better for our present purposes if we knew the number in each 5-year group, that is the number aged 20 to 24, 25 to 29, 30 to 34, etc. However, it is possible from the figures given in the table to construct curves which must represent very nearly the correct distribution, by ages, of the various trades.

"Diagram III shows such a distribution for five important building trades. The curves show for each trade the number of men at each age from 17 to 75 for every 100,000 workers. For each 100,000 electricians, for instance, there are 1,550 who are 17 years old, 5,000 who are 25 years old, and 1,800 who are 40 years old. Similarly, there are 500 carpenters who are 17 years old and 2,800 who are 45 years old.

III. AGE DISTRIBUTION



"The next curve shows how the death rate varies among the male population of the United States according to the life tables prepared by the United States Census Bureau. At age 17, the death rate is 3.65 per thousand; at age 50 it is 15.81, and at age 75, 92.72. A comparison of this curve with the five curves showing age distribution will make it at once evident that the death rates among carpenters and masons must be much greater than among electricians or plumbers."

I. MEN IN BUILDING TRADES IN UNITED STATES IN 1920 GROUPED BY AGE PERIODS

ARTISANS	17–19	20–24	25–44	45–64	65 and over	Un-known	Total
Carpenters	16,541	59,178	412,626	332,064	65,436	1,363	887,208
Painters, glaziers and varnishers (building)	4,377	16,053	126,288	86,972	14,398	306	248,394
Electricians	13,818	47,579	127,309	22,883	1,114	242	212,945
Plumbers and gas- and steam-fitters	6,894	30,636	124,078	42,213	2,654	240	206,715
Brick and stone masons	1,352	7,760	62,707	49,252	10,024	162	131,257
Tinsmiths and sheet metal workers	2,378	8,535	37,675	18,140	2,904	93	69,725
Plasterers	367	2,259	19,630	13,393	2,517	83	38,249
Stone cutters	305	1,340	10,911	8,319	1,201	20	22,096
Structural iron workers	394	2,269	12,151	3,842	154	26	18,836
Paper hangers	268	1,058	9,398	6,618	970	26	18,338
Roofers and slaters	295	1,163	6,253	3,236	417	14	11,378
Cement finishers	63	405	4,553	2,411	171	18	7,621
Coppersmiths	212	755	2,853	1,271	136	5	5,232
Total	47,264	178,990	956,432	590,614	102,096	2,598	1,877,994

ELIMINATING THE ARCHITECT?

IN a somewhat grotesque presentation of the simplicity of absorbing the functions of the architect within the contractor's organization, a member of the Associated General Contractors threatens dire results for the future of the profession. The cause of this outburst is presented in an article which appeared in the *Bulletin of the A. G. C.* We are inclined to agree with some of the general statements in this article, but please, Mr. Contractor, remember that the shoe has been on the other foot many times, just as you say in the last paragraph!

Here is the *causus belli:*

"The vital question of day labor under the general supervision of the architect *versus* the management of the construction of a building by a responsible general contractor comes up again in a case involving members of the A. G. C., wherein work was begun according to the former system with the belief that it would be cheaper.

"In this particular case, the architect made the statement that the job was not awarded, in the first place, to a contractor, because the plans were incomplete, and was not given to anyone at any later date for the same reason. He also asserted, in justifying the methods involved, that a great deal of material and equipment had already been ordered, and a competent foreman had been placed in charge.

A. G. C. Member Protests

"In protesting to the effect that the contractors had not received proper consideration, the A. G. C. member held that

the architect could not have decided that a day-labor job was cheaper than a contract job unless he concluded that a contractor's fee is dead loss, and that in following this same thought the owners should have concluded that a competent draftsman could have been employed to eliminate the architect's fee. He also stated that in view of the great amount of work done by contractors on a percentage or fixed-fee basis, the claim that it was impossible to award the work in question to a contractor was rather unreasonable.

"The contractors submitted to the building committee, acting for the owners, the proposition that if the architect would make an estimate of the cost of the work and would guarantee his estimate with a bond similar to the one required of a contractor, and his estimate should be lower than that furnished by a contractor with the same guarantee, that they would raise no objection. The architect, however, would not do this."

The A. G. C. opinion sent to the member follows:

Minnesota Law Shows Waste from Day Labor

" 'One of the most convincing arguments that we have noted against the performance of construction work by day labor is the passage of a bill by Minnesota, requiring that accurate costs, including all overhead and indirect expense, be kept on every public project amounting to more than $1,500. This law resulted from certain accounting practices of the state departments which enabled them to cover up many of the indirect expenses of day labor work, thus showing costs lower than the usual contract prices. This law was all that contractors and those interested in the economic aspect of the question needed to show taxpayers the wastefulness of day labor work, and it has been effective, we are advised, in demonstrating that the contractor performs the work more cheaply than it can be performed by forces of the state.

Each to His Own Profession

" 'Most architects recognize the need of expert personal service in management such as that performed by the general contractor, and do not approve of the architect's entering into this field unless he is prepared to render better managerial service than the contractor. An article by Sullivan W. Jones, a well-known architect, published in the *Bulletin* of January, 1920, expresses disapproval of either the contractor's performing architectural service or the architect's performing construction service. This view is held, I believe, by the most ethical men.

Two Types of Mind Involved

" 'From such investigation as we have been able to make, no instance has yet come to hand where an architect has attempted the entire service of management and succeeded as well as a capable general contractor. It is commonly recognized that the two types of mind involved in design and execution of construction are essentially different. One is the artistic or scientific, typified in architects or engineers, and which is seldom able to cope successfully with labor, purchasing and the less concrete problems of management. The other type is that typified by an enterpriser, such as the contractor or manufacturer, who possesses the aggressive characteristics essential to efficient management.

" 'Excepting for an individual here and there who is either simply ignorant of the economics of construction, or has a desire to mislead, it is recognized that construction management is a science or profession in itself, the cost of which cannot be avoided merely by dispensing with an individual called the general contractor. The same service must be performed by the architect or engineer, and it is absurd to imagine that they can do it more efficiently than a specialist in this particular business. As you know, some of our members furnish the service of design as well as construction, but they do not attempt to mislead their clients by stating that they eliminate the architect or engineer. On the contrary, they employ the best architects and engineers they can find, and guarantee not only successful work but a fixed cost thereof. The principal thing that they sell on is elimination of the breach between design and construction service.

Architect's Construction Service Involves Expense

" 'The fact mentioned in your letter that the architect is not willing to guarantee cost shows the weakness of his position, and emphasizes a gap in his service which should be easily recognized by any prospective owner. That the architect cannot perform construction service without increased expense is shown by the standard document of the American Institute of Architects, which stipulates that in case of default of the contractor, where the architect is to carry out the work, he shall receive additional compensation for his service of management.

Combining Design and Construction Likely

" 'Unless architects recognize their limitations as well as the true economic factors involved in construction, contractors may find it advantageous to play the same game that your local architect is attempting, namely, to incorporate in their service the function of design and deal directly with the owner, delivering him, without worry, a satisfactory structure. As between the two cases, one where an architect takes on the construction function and the other where a contractor takes on the architectural function, there is little doubt as to which would eventually prove more successful. The contracting, or managerial, mind would become the enterpriser who guarantees his service from start to finish, and the architect, or rather those men having architectural minds, would be forced into the organization of the enterpriser. The success with which this has been done by certain individuals fully demonstrates its practicability. It appears as one ultimate solution, if co-operation fails to link up design and construction service into a smoothly functioning agency.' "

FINANCIAL AND INVESTMENT OUTLOOK

THE *Straus Investors' Magazine* presents some encouraging facts regarding the financial outlook. The fact that all of the investments made in the bonds of S. W. Straus & Co. are turned immediately into channels of building construction adds interest to its opinion:

"Financial conditions at the midsummer period seem to be more satisfactory than they have been at any time since 1919. This is particularly true in the investment world. The period of extravagant and careless investment which immediately followed the armistice and was succeeded by a disastrous slump in which millions of dollars were lost, has finally been replaced by a substantial market for sound investments.

"Most investors have learned a lesson. Whether victims of unsafe investments or not, they have kept informed on financial matters and they know, if not from actual experience, that safe investment depends upon the most careful study and consideration of both the securities and the offering house.

Demand for Real Estate Bonds

"A year ago, the real estate bond market was beginning to feel the effects of the reaction against speculative ventures. Many men who had never before owned a first mortgage real estate bond began to investigate and discovered that this form of security is one of the safest and best investments on the market. They became real estate bond owners.

"Building is now going on as extensively and perhaps more generally than at any other time since the beginning of the war. The public is absorbing the bond issues as they come out, and the general world of investors and builders shows nothing but confidence and faith in the future of apartment houses and office buildings in good locations in our large cities.

"In the United States, to a certain extent, and throughout Europe, to a much larger extent, there seems to be a general feeling of political unrest. In our own country we have the strike of the railroad shop workers and other branches of the railroad craftsmen. Although the union leaders had predicted that this strike would entirely paralyze rail traffic throughout the country, the general public has as yet had little indication that the strike order has gone into effect. The railroad heads, on the other hand, assured the patrons of the lines they control that the passenger traffic would not suffer the least change of schedule. This too is something of an exaggeration, for New York during the first two days of the strike found its suburban railroad service sadly disorganized.

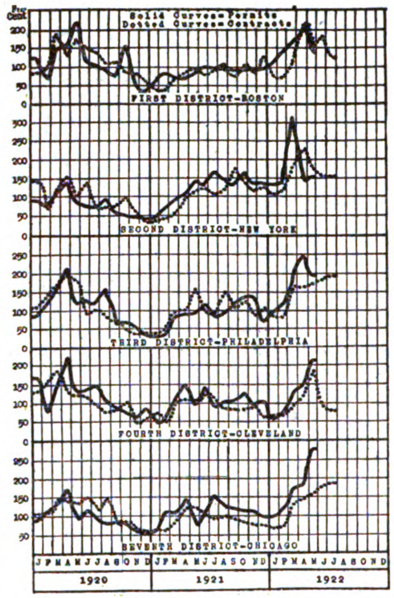
"As a whole, however, the railroad strike has caused scarcely a ripple in the tranquil life of the average American. That the strike, if it continues, will make itself felt in the investment world is almost certain, but it is not probable that any serious consequences will result unless the trouble spreads to other branches of the railroad brotherhood."

COMPARISON OF BUILDING PERMIT AND CONTRACT VOLUMES

AN interesting question which has often been advanced by those interested in following the volume of building construction refers to the possibility of anticipating the volume of contracts to be let by a consideration of the volume of construction involved in the total of building permits issued.

Index, the statistical service publication of the Associated General Contractors of America, has recently presented an analysis of this question which provides a definite answer:

"The purpose of the diagram included here is to test the question whether it is true that, from the value of permits issued in any month, a valid conclusion may be drawn as to the value of contracts likely to be let in the following month. We have already shown in previous issues of *Index* that there seems to be no such sequence as regards the country as a whole. In this diagram we have tested the question for each of the five districts, separately. In each section of the diagram the solid curve represents the fluctuation in permits issued, and the dotted curve the contracts let; here the percentages which the figures for each month show are the average monthly figures for the two years, 1920 and 1921. The curves prove conclusively that in none of the districts is there any such connection between permits and contracts as that just suggested.



Permits issued in principal cities and contracts let in entire territory, for five Federal Reserve Districts, in per cent of the monthly average of 1920 and 1921.

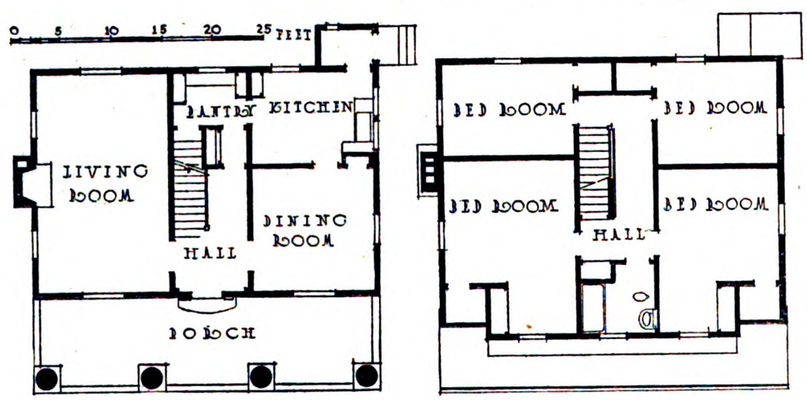
"In no district can one safely say that an increase or a decrease of permits in one month will be followed by a similar increase or decrease in contracts during the next month. It is evident that permits fluctuate more violently than contracts; that they both show a good deal of irregularity from month to month, but that, upon the whole, they tend to go up and down together. It is evident from the curves that the effect of the recent building boom has been most marked in the New York and Chicago districts, less so in the Boston and Philadelphia districts, and least in the Cleveland district."

NATIONAL ELECTRICAL SAFETY CODE

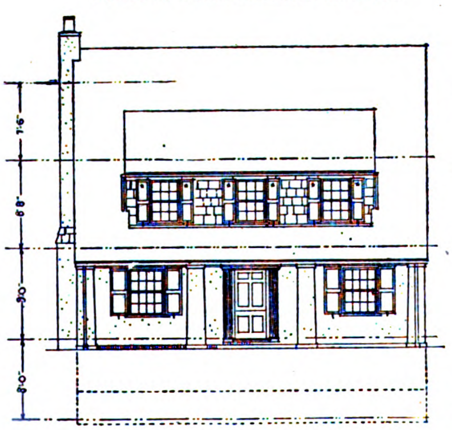
THE American Engineering Standards Committee, by letter ballot, has approved the National Electrical Safety Code of the Bureau of Standards which covers the generation, distribution and utilization of electricity for power, light and communication.

In making public this decision, the Standards Committee announces that there is now in process of formation a thoroughly representative sectional committee to consider any revisions of Part 2 of this Code, "Rules for the Installation and Maintenance of Overhead and Underground Electrical Supply and Signal Lines," which may be deemed necessary by any of the interested parties.

Monthly Estimates on Typical Small House



Floor Plans and Elevation of Typical House on Which Estimates Are Based



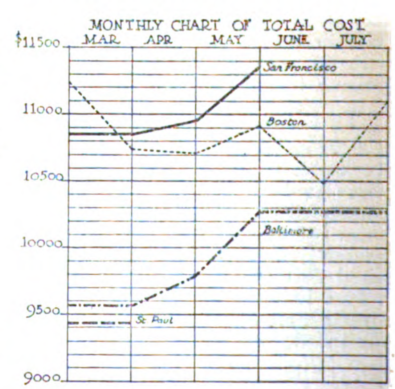
WE have submitted working drawings of this house, together with a quantity survey of materials, to a representative contractor in each of the cities named, and have secured bona fide estimates which are tabulated below. Specifications are in accord with good practice in the several localities as found in houses of this size built under the supervision of architects. The figures are for the cost complete, including contractor's overhead and 10 per cent profit, but excluding architect's fee.

The cubage of the building is figured from the first floor area exclusive of porches and a height measured from 6 ins. below cellar floor to half point of gable, to which is added cubage of kitchen entry and half the cubage of porch, taking height from footings to plate of dormer.

COST OF HOUSE (Cubage, 27,150 ft.)

	June	July	August
Baltimore	$10,272.50	$10,272.50	$10,272.50
Cu. Ft.	.378	.378	.378
Boston	$10,906.50	$10,480.91	$11,106.76
Cu. Ft.	.401	.386	.409
San Francisco	$11,347.00		
Cu. Ft.	.417		

The variation in price in the Boston territory is accounted for in June by reductions in brickwork, plastering and stucco which were more than offset in July through increases in plumbing, heating, painting and finish lumber.



THE ARCHITECTURAL FORUM

OCTOBER

1922

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THE ARCHITECTURAL FORUM

VOLUME XXXVII NUMBER 4

CONTENTS for OCTOBER 1922

PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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THE EDITOR'S FORUM

MOTION PICTURES HELP CONSTRUCTION

SINCE the services of the motion picture are being utilized to promote the welfare of many forms of activity, its use in promoting building is quite logical. In several parts of the country, notably in California and Ohio, much interest has been stimulated by the construction of "model houses," suitably furnished, the theory being that anyone seeing such a model would be apt to become a home owner. But since the appeal of even the most attractive model home could be at best limited to its own immediate locality, some more universal means of appeal was seen to be necessary,—and what more logical than the motion picture?

The demand has brought about what is described as the creation of a five-reel film which will show the actual erection of a modern 6-room brick colonial house, together with its equipping and furnishing, the final scenes probably showing the house as the home of a happy and contented family. To make the presentation as interesting as possible, an unusually attractive suburban plot has been selected, and since the production of these pictures is to be done with the co-operation of many organizations associated with the progress of building, it may be safely assumed that the production will do justice to the subject matter.

The films are described as holding the spectators' excited interest from beginning to end. They are said to correct some of the popular misconceptions of the difficulty of building and to leave the observer with a strong desire to become a home builder.

That the display of these motion pictures will be widespread is guaranteed by the fact that the films will be shown all over the country under the auspices and with the co-operation of real estate boards, commercial, advertising, Rotary and other clubs and organizations, churches and community centers.

A CORRECTION

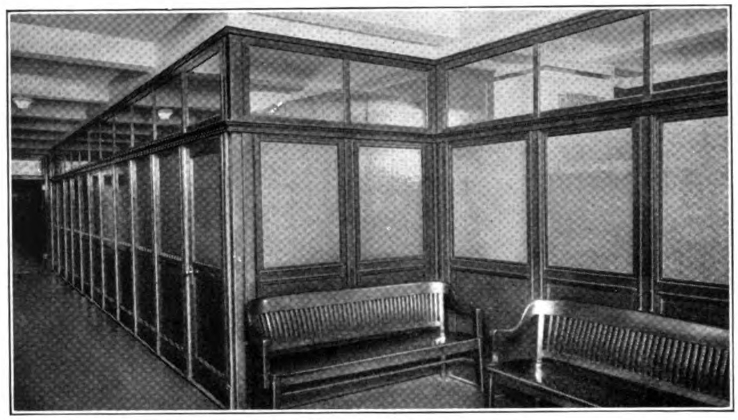
WE regret to find that an error was made in connection with the illustrations accompanying the article entitled "The Modern Publishing and Printing Building" in THE FORUM for July. The illustrations upon pages 5 and 6, instead of showing the pressroom and the bindery in the plant belonging to the Metropolitan Life Insurance Company, portray similar departments in the establishment of the J. F. Tapley Co., other tenants in the building. Further errors were made in writing of equipment in printeries and binderies by crediting to the Metropolitan workrooms certain layouts of machinery which we find belong to the same manufacturers.

MOUNTING BUILDING COSTS

IN addressing the presidents of some 200 national organizations identified with the building industry, Franklin D. Roosevelt, the president of the American Construction Council, points out the existence of certain dangers which threaten the prosperity of building. It will be remembered that the boom in construction which prevailed during the 1919–20 period was attended by an unusual advance in wage rates and material prices and was followed in due course by the inevitable era of depression which comes after a period of unsound business activity.

The present heavy demand for everything which enters into building might easily result in a repetition of the history just referred to; the prices of building materials have risen sharply, with the rates paid to building labor not far behind, if not slightly in advance. Specific instances of abnormal costs are not lacking, resulting in several cases in the curtailment or abandonment of extensive building programs. In Philadelphia the cost of school building has advanced 18 per cent over the low index of 137 of last spring, on a basis of the 1913 index of 100, and this increase has already led to the postponement of a large part of Philadelphia's projected school building campaign. Costs of residence building are increasing in Cleveland, where up to August 1 of the present year the value represented by building permits reached nearly $20,000,000, or almost twice their value during the same period a year ago, but the cost of this construction is so great that it necessitates the asking of exorbitant rentals in order to obtain even a fair return on the money invested. In the Boston district the prices of building materials have advanced about 17 per cent over cost of the same materials last January, while the wage rates of labor have soared, the closely unionized trades, such as bricklayers, plasterers and carpenters and skilled workers in certain other trades now being advanced to the same wage scales which prevailed at the peak of high costs.

The uncertainty attending building costs works considerable hardship upon architects. Clients are often impatient to build notwithstanding the excessive cost of building, and yet an architect who has his clients' interests at heart and who keeps in touch with the fluctuations of construction costs is apt to feel unable to recommend building at the present expense. It is earnestly to be hoped that the warning to the industry by the president of the American Construction Council will have the effect of curbing the tendency to maintain prices at a point which would result in grave injury to the public.



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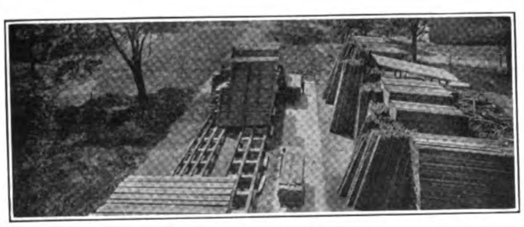
It dries here—not after it is erected in an office.

Our catalog describes the construction in detail. You are welcome to a copy.



Lumber drying in Telesco Park

13C

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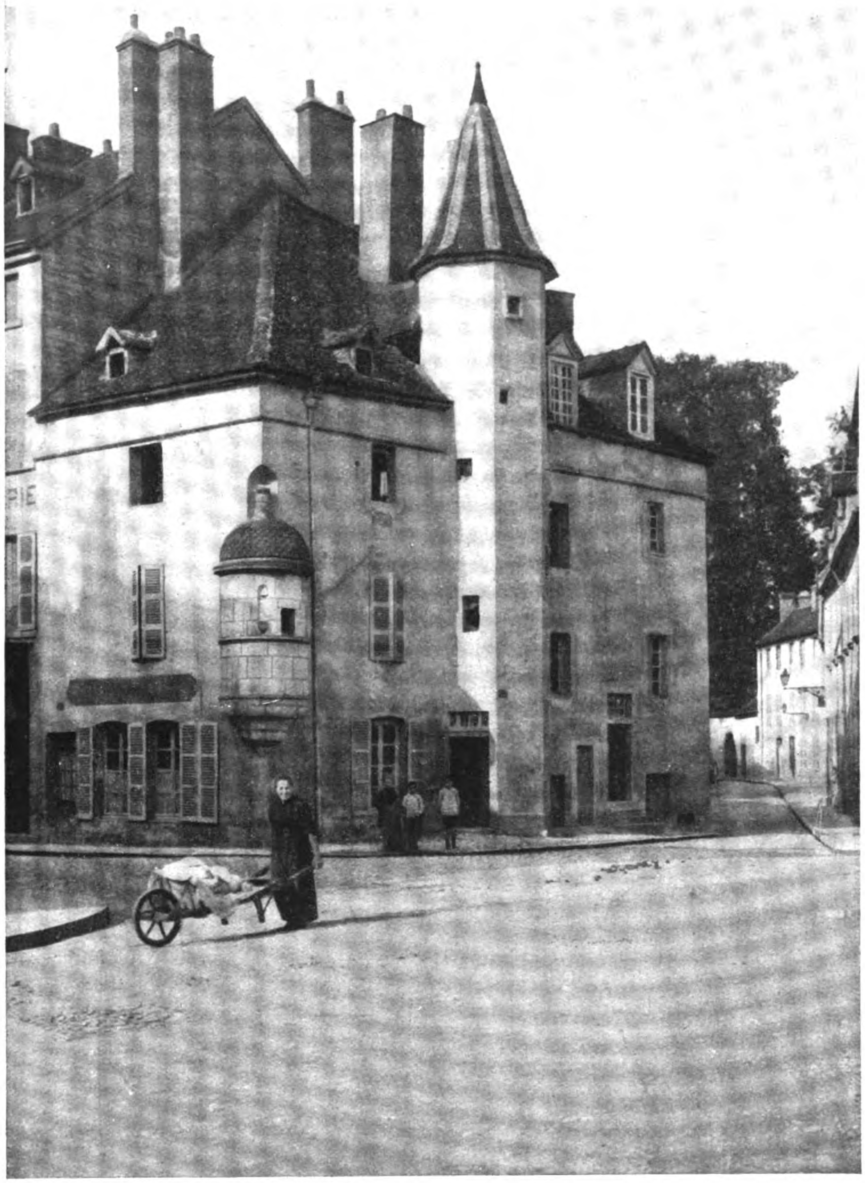


PLACE MAUFOUR, BEAUNE, FRANCE
FROM PHOTOGRAPH BY G. DOLBY

The
ARCHITECTURAL
FORUM

VOLUME XXXVII OCTOBER 1922 NUMBER 4

Harwood House, Annapolis

By HAROLD DONALDSON EBERLEIN

Measured and Drawn by J. FREDERICK KELLY, A. I. A.

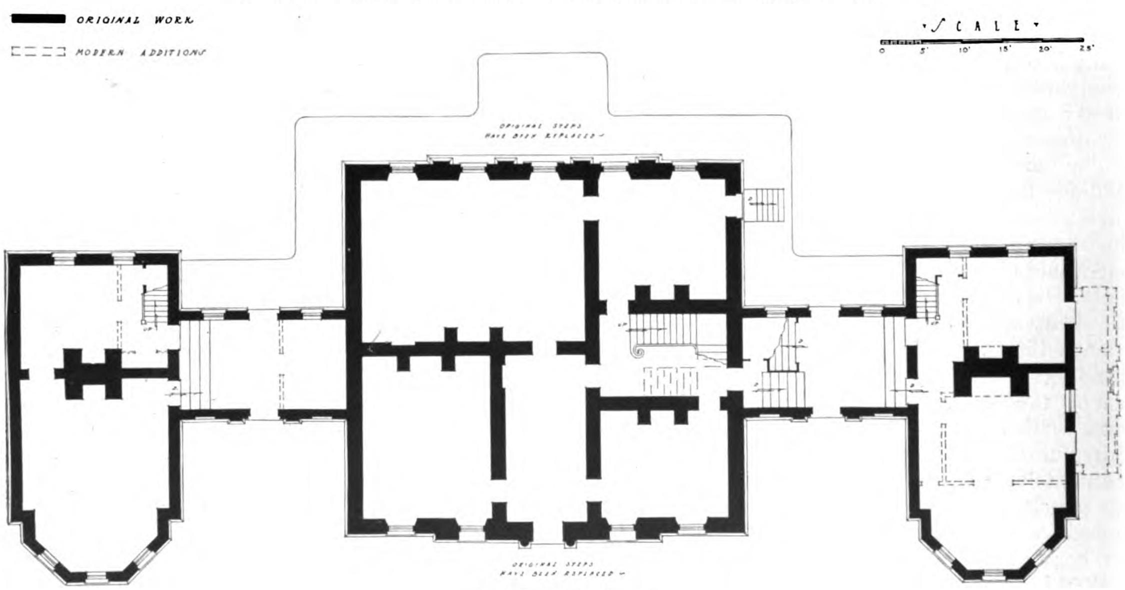
HARWOOD HOUSE, at the corner of King George street and Maryland avenue, in Annapolis, is deservedly one of the show places of that architectural paradise, rich in its possession of many unspoiled Georgian houses of the finest character. In 1774, when it was built, the house was designed as a wedding gift,—so goes the story,—from Matthias Hammond to his intended bride. He had even ordered all the furnishings with punctilious care, and the wedding day was set, when the lady declared that he paid more attention to his new house than he did to her and would have nothing more to do with him. Hammond remained a bachelor. After several changes of ownership the house passed by purchase to Jeremiah Townley Chase, who bought it in 1811 as a home for his daughter, from whom it eventually descended to her granddaughter, Miss Hester Ann Harwood, the present owner.

The architect was William Buckland, an ancestor of the owner, of whose other work one would gladly know more. His achievement in Harwood House stamps him as a man of no mean ability and whets the desire to learn further of his architectural labors. Unfortunately, owing to the paucity of existing records, we are obliged to content ourselves with this single testimony to his capacity, the excellence of which, however, is sufficient to establish his reputation. It is interesting to note that his portrait, showing him seated at a table with his instruments and a draft of the elevation and plan before him, is still preserved in the house he designed. The structure has always been cherished by its owners and has never suffered from neglect, the defacements of ruthless alteration, or the ravages of war, and thus possesses an enhanced value as an intact record of eighteenth century architectural achievement.


Detail of Street Entrance, Harwood House

The fabric is of red brick laid in Flemish bond, while the projecting string course between the lower and upper floors and the splayed lintels above the windows are of rubbed brick. In numerous instances the rubbed bricks of the lintels are marked with false joints to ensure the utmost precision of appearance. Even the rubbed lintels over the cellar windows have received this same meticulous care and bear witness to the desire for perfection of finish which is amply attested in every particular of this dwelling from top to bottom, both inside and out. The broad mortar joints between the stones of the foundation walls, which appear above the ground level, are galleted with little spawls. The practice of galleting the mortar joints of stone masonry, as shown by not a few similar instances in the vicinity, seems to have been a

GENERAL STREET VIEW. PORCH AT EXTREME RIGHT IS MODERN WORK



FIRST FLOOR PLAN

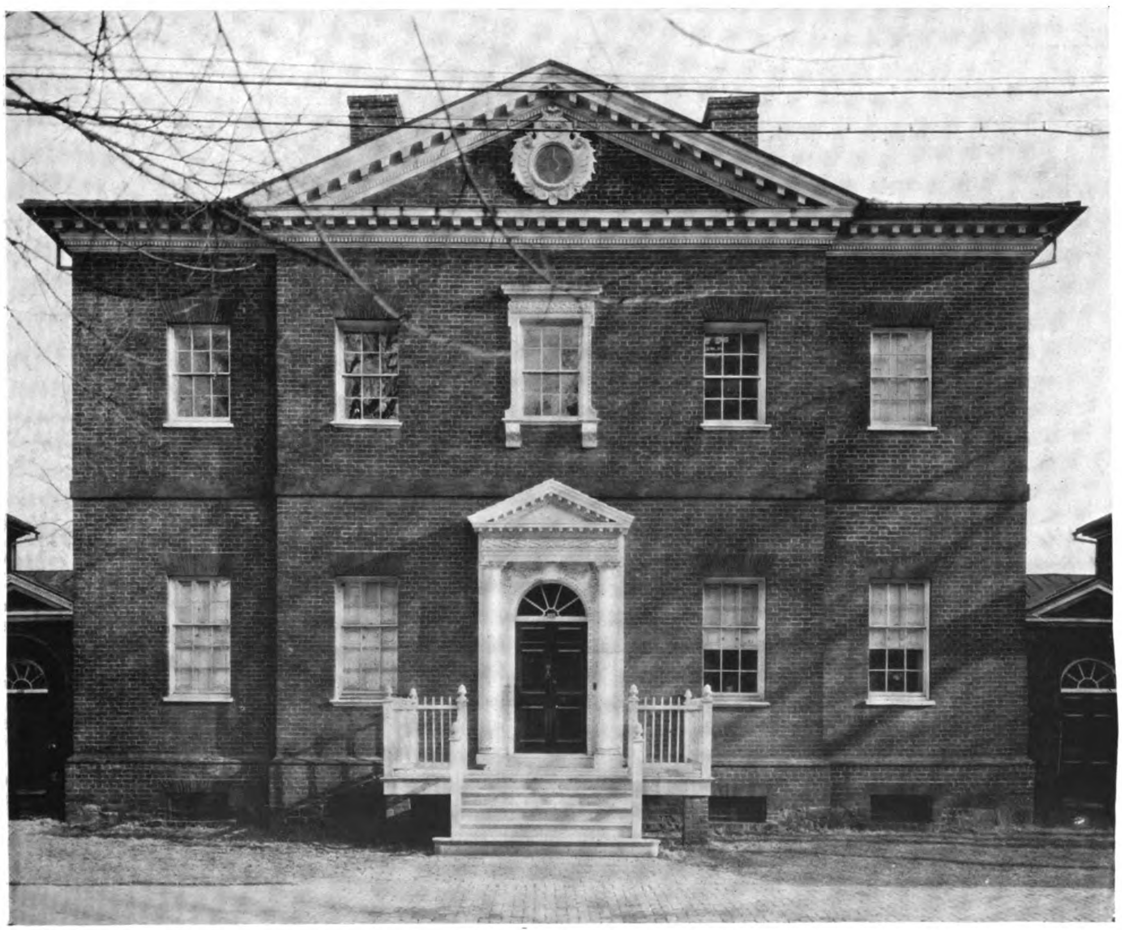
HARWOOD HOUSE, ANNAPOLIS

local tradition, as it was also in the neighborhood of Philadelphia.

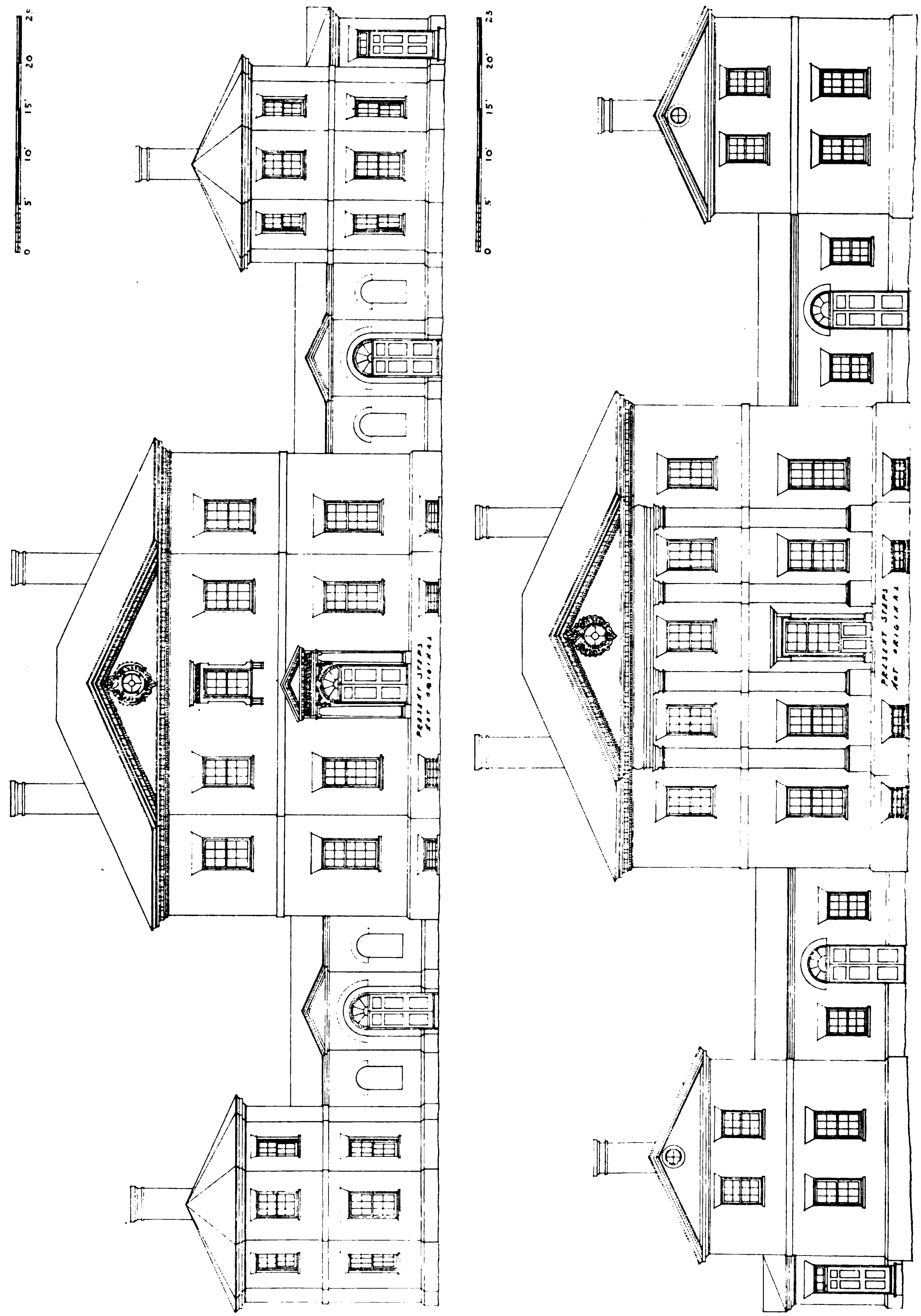
The projecting base is capped by two courses of moulded bricks, the lower course a half-round or torus, the upper a scotia. More moulded bricks, of appropriate profile and the utmost refinement of finish, appear in the bases and capitals of the four pilasters which grace the garden front. It will be observed that the horizontal emphasis of the garden elevation has been ingeniously preserved by breaking the string course around these pilasters. The arches above the doors and recessed panels, in the walls of the two connecting galleries between the main house and its wings, are likewise of rubbed brick, thus supplying a certain slight degree of color emphasis for structural features without resorting to the bolder expedients of color contrast or projection. A further touch of interest is given by introducing within these panels the all-header bond which enjoyed such popularity in Annapolis. This bond, so far as is known, was peculiar in the eighteenth century to Annapolis and Chestertown, and was presumably borrowed from a usage more or less common in the midland counties of England.

There are some distinct traces which show that the very inadequate wooden steps, both before the street door and the garden door, are later substitutions and are not those contemplated by the architect in the original design. Even were these traces lacking, it would be impossible to attribute the present steps to Buckland or to believe that anyone who had succeeded in creating such an architectural gem as the house is otherwise could have failed so utterly in providing suitable means of access to its entrances. Justice to the architect's memory demands allusion to this apparent shortcoming. These steps and a small vestibule addition at the side of the south wing, rendering it suitable for use as a separate residence, are the only changes made to the fabric since its erection.

The exterior woodwork, of both the street and garden fronts, exhibits the most exquisite delicacy of workmanship joined to a wealth of design at once robust and elegant. Both the disposition and the execution of the swags and drops of ribbon, fruit and flowers that adorn the spandrels above the main door are singularly felicitous and full of lively grace. Unfortunately, the ends of the volutes of



Central Pavilion, Street Front of Harwood House

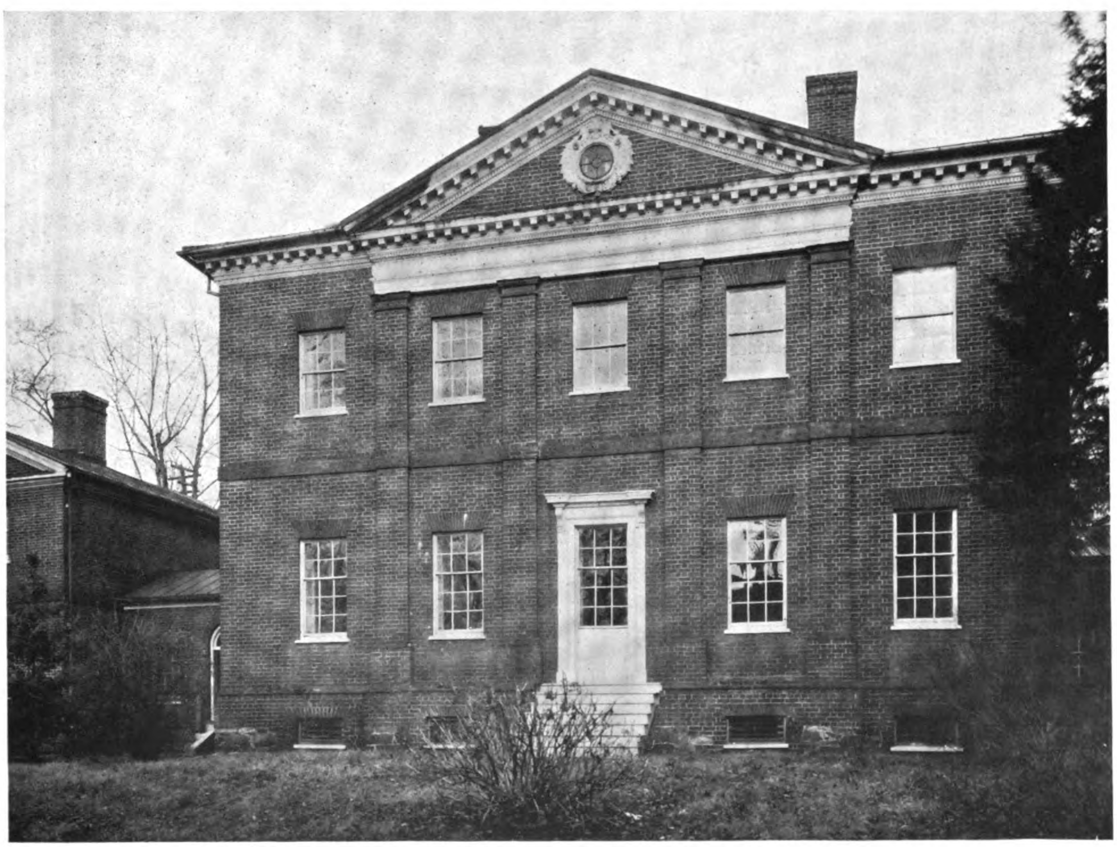


ELEVATIONS, HARWOOD HOUSE, ANNAPOLIS
MEASURED DRAWINGS BY J. FREDERICK KELLY

the little crushed capitals surmounting the engaged columns of the doorway have become unglued and dropped off; otherwise the carved ornamentation is intact. It is to be regretted that many successive coats of paint have almost obliterated some of the more minute details of enrichment, such as the acanthus cyma beneath the pulvinated frieze and the smaller carved cyma below the broad fillet. These particulars, however, appear in all their pristine crispness in the measured drawings. At the same time, the agency of accumulated paint gives the inbricated band of water leaves on the frieze an agreeable mellowness. The three points of carved embellishment on the street facade—doorway, window frame, and bold cartouche surrounding the attic bull's-eye light in the pediment—are happily conceived and give a distinguished individuality to the whole composition. The garden doorway, though of a totally different type, possesses no less charm of refined design and execution than does the street doorway.

The interior woodwork is equally deserving of praise, and the excellence of the joinery matches the quality of the carving. In the dining room, from which opens the garden door disguised within as a window, and in the ball room directly above, we find the greatest elaboration lavished. The carved mouldings surmounting the baseboard and the carved chair-rail, with its gadrooned quarter-round crown, carry completely around the circuit of the rooms notes of continuous enrichment, reaching appropriate climaxes in the decoration of the doorways and fireplaces. The pattern of the inside folding shutters, with alternating elongated and equal-sided octagon panels, the latter enclosing foliated carved rosettes, is characteristic of Annapolis and is found in several other houses of a somewhat earlier date. The present color scheme, it is scarcely necessary to add, is not original and sadly detracts from the value of the carved decoration. It seems to have been applied at some time during the "seventies" or "eighties." In all probability the woodwork was painted white and may have had the additional embellishment of parcel gilding, as we know was the case at Mount Vernon and in several other places. Despite their present unedifying color, the mind's eye can readily see what these rooms must have been in their original glory.

Inspection of the plan will show that the staircase did not figure in the entrance hall but was enclosed in a separate stair hall at one side, the architect in this respect choosing to follow a certain phase of Palladian precedent, ensuring an air of greater formality to a comparatively small house.

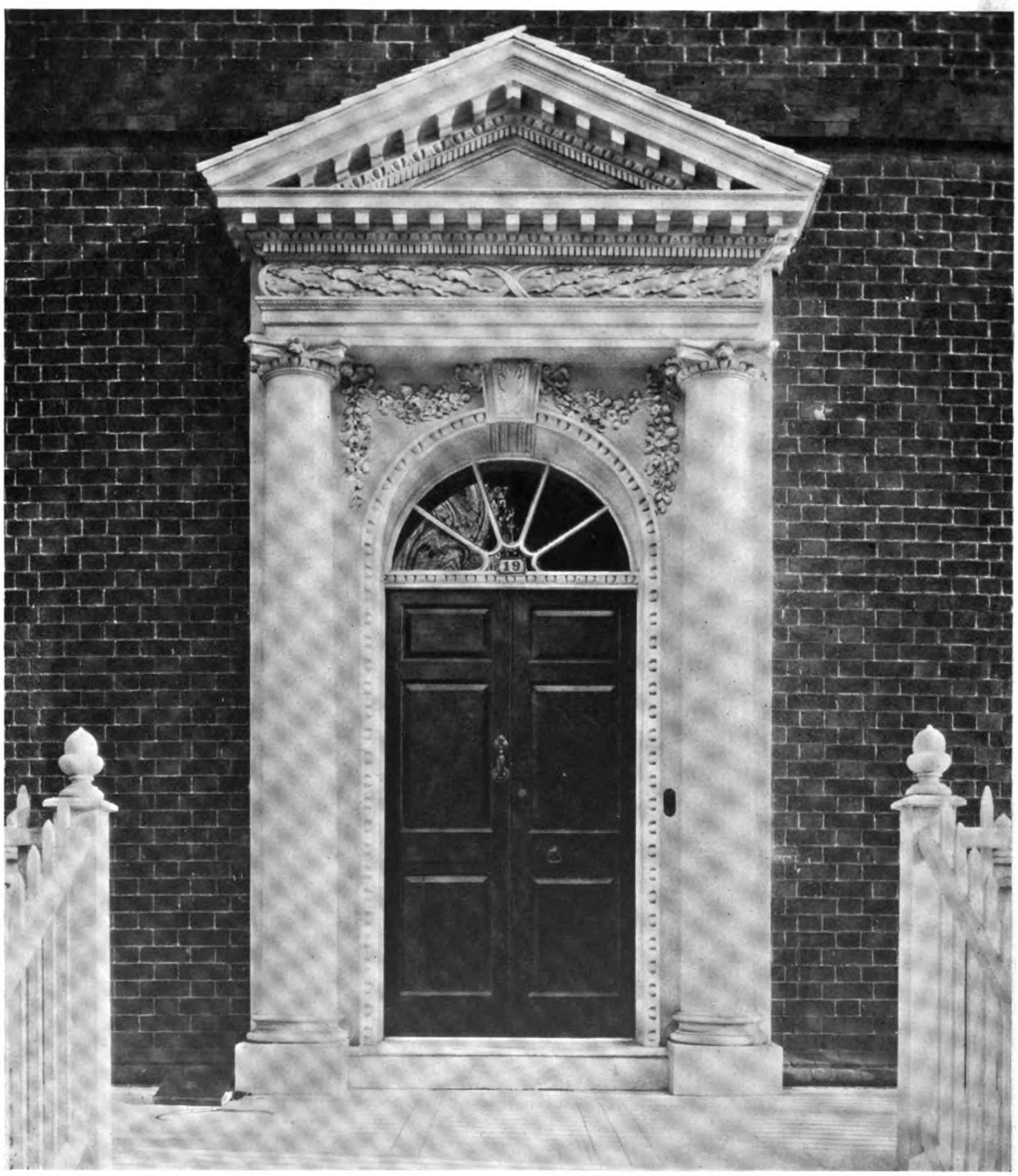


Central Pavilion, Garden Front of Harwood House

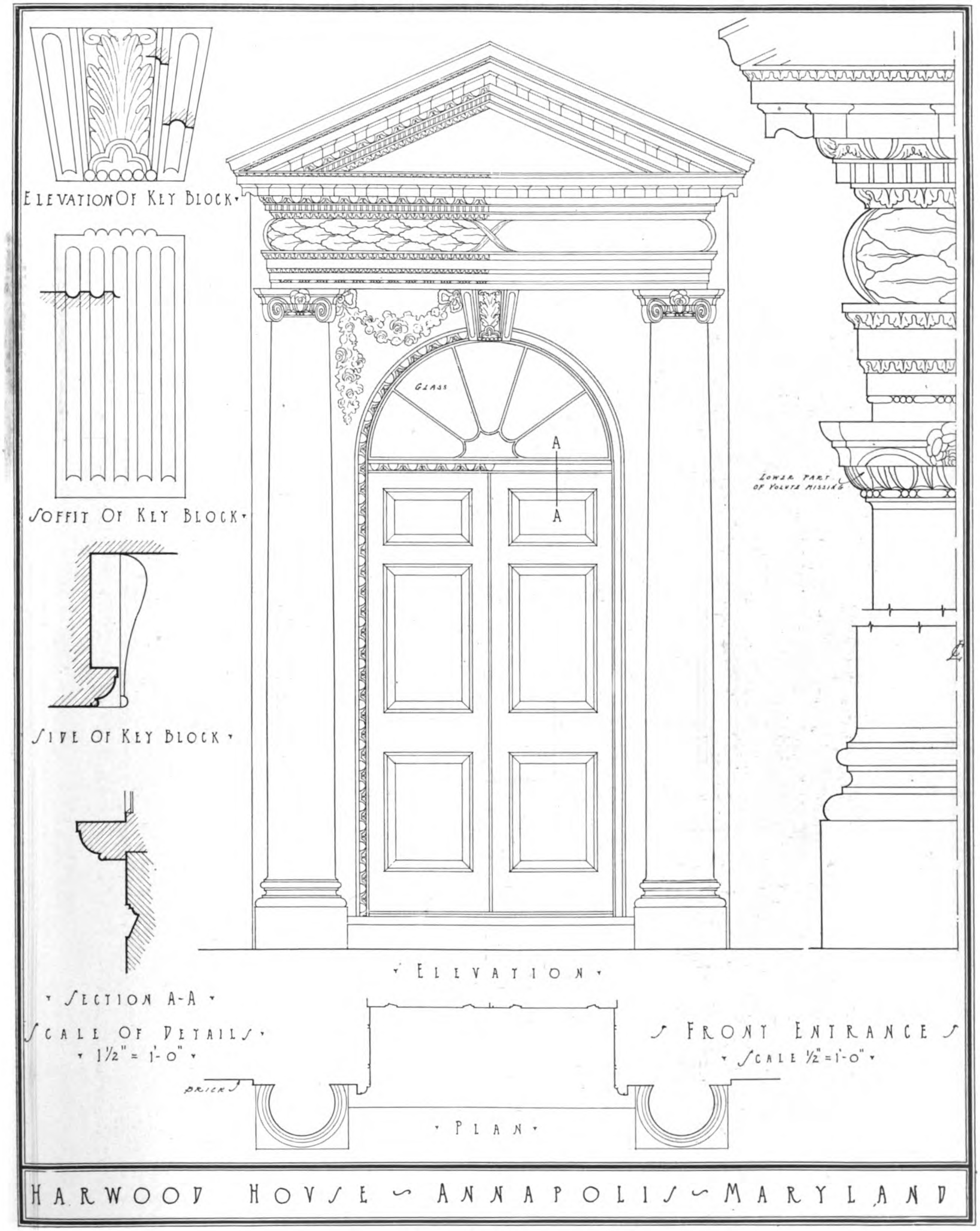
The kitchens and house slaves' quarters were in the south wing, an arrangement which entailed no inconvenience in days when there was no lack of domestics for expeditious service. The north wing, now used as a separate dwelling, had no direct connection with the rest of the house. The original owner, and several of those succeeding him, were barristers and used this north wing for their offices.

There is a tradition in Annapolis that Matthias Hammond at first intended to build his house without wings and three stories in height. Edward Lloyd IV, of Wye, who then owned and occupied the Chase house on the opposite side of the street, saw that if this plan were carried out it would completely shut off his view of the bay. Representing this objection to his friend Hammond, the latter, in consideration of some financial inducement, consented to alter his plan and build instead a lower house with wings at each side.

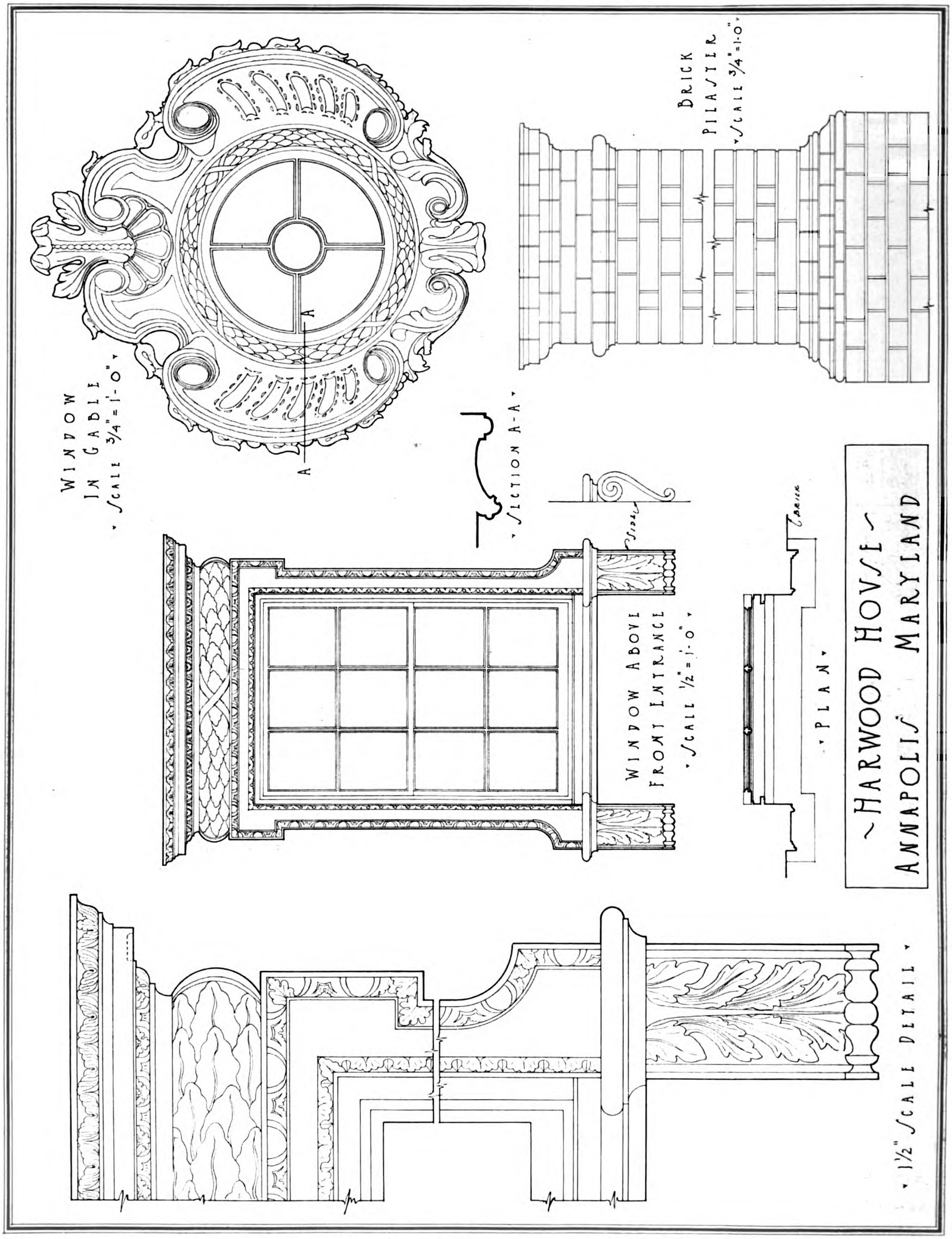
Its lesson as a piece of composition is a most wholesome subject of contemplation for us at this time, for it is an unfortunate fact that in certain quarters domestic design in any of the phases the classic mode has assumed since its adoption in England has fallen into a state of deplorable dullness. There are architects—would that they were fewer in number!—who seem to feel that they have discharged all obligations on the score of



Street Doorway of Harwood House



MEASURED DRAWING BY J. FREDERICK KELLY



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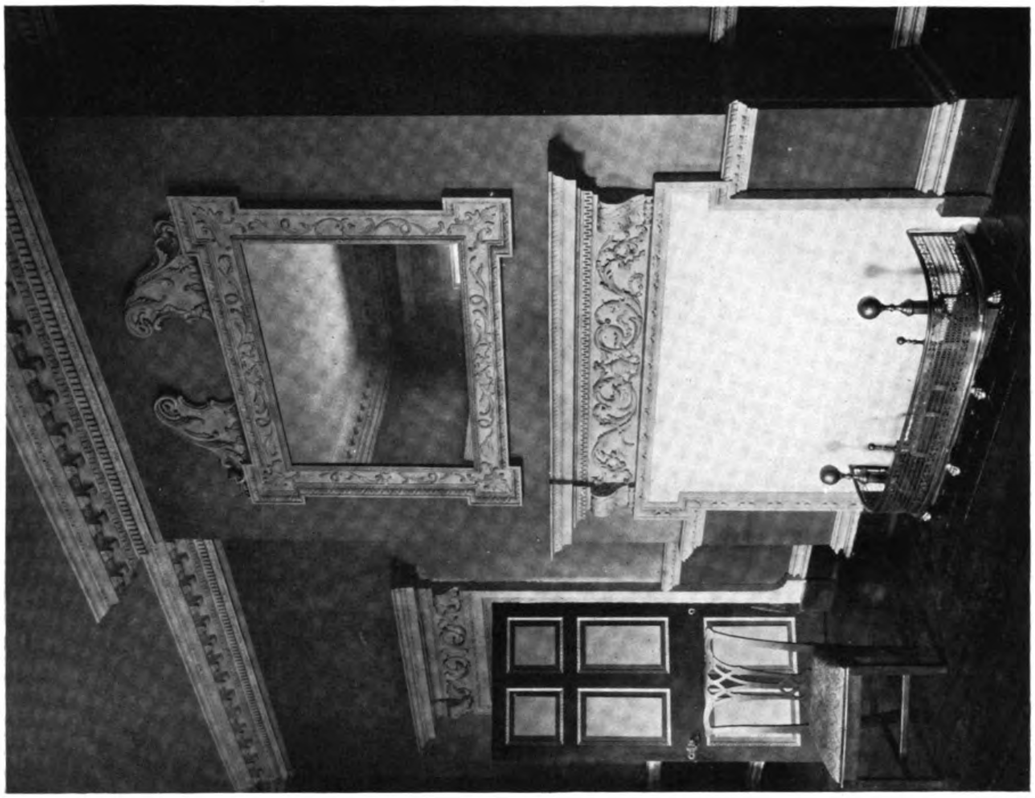
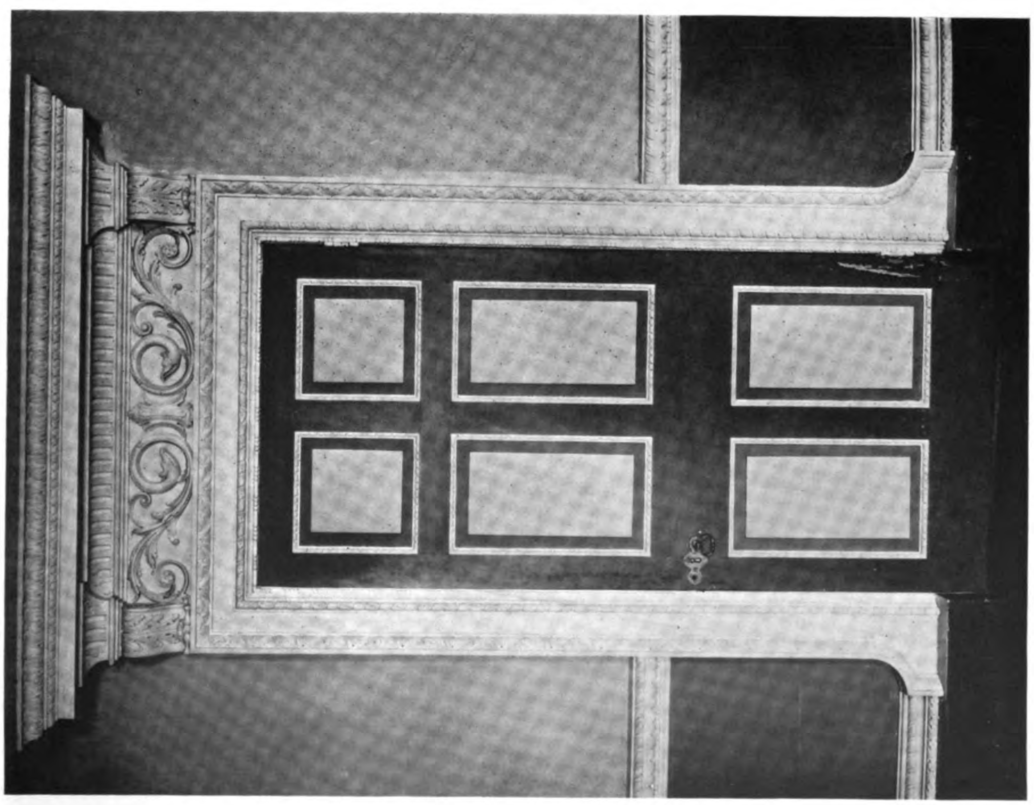
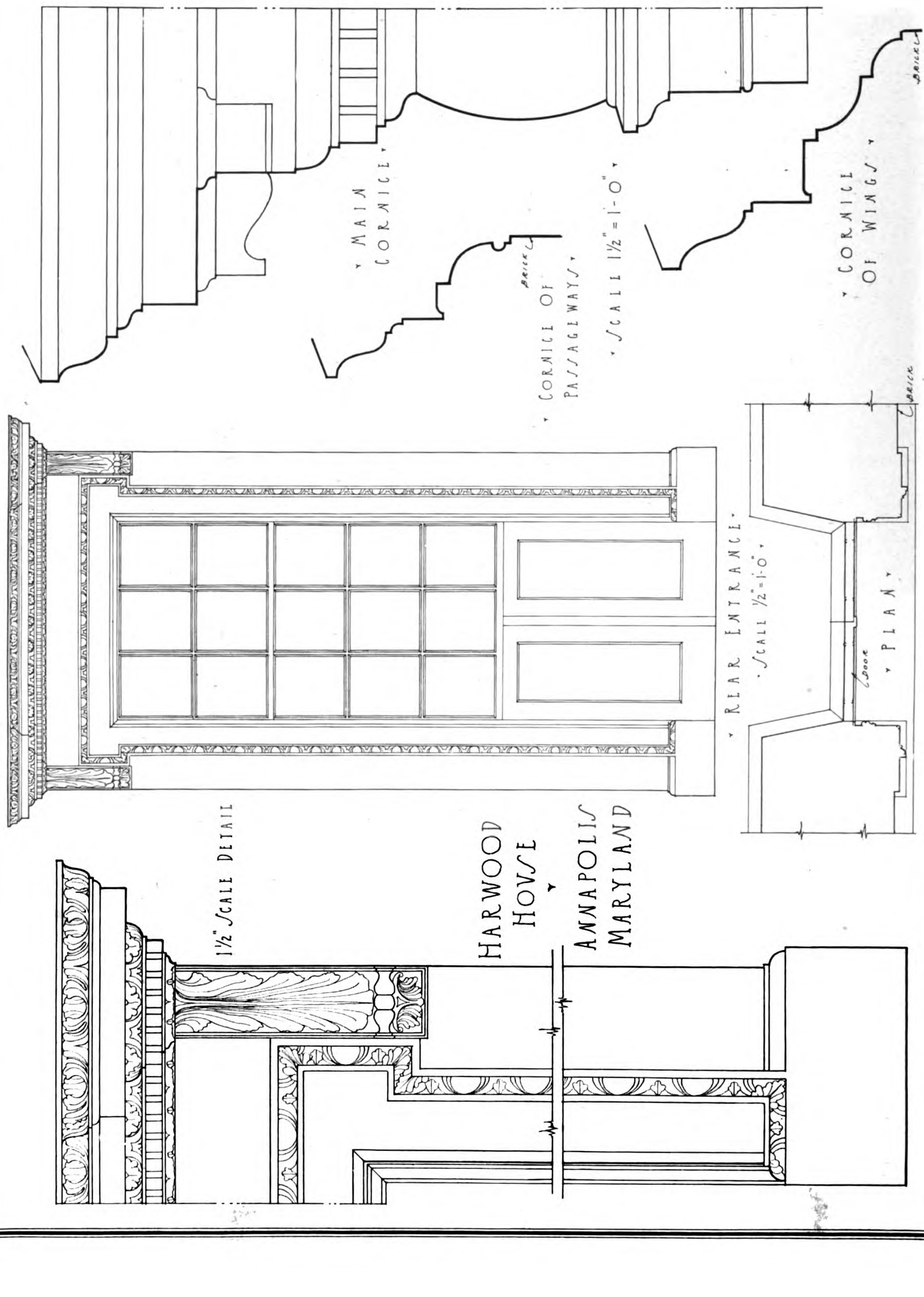


DETAIL OF FIREPLACE



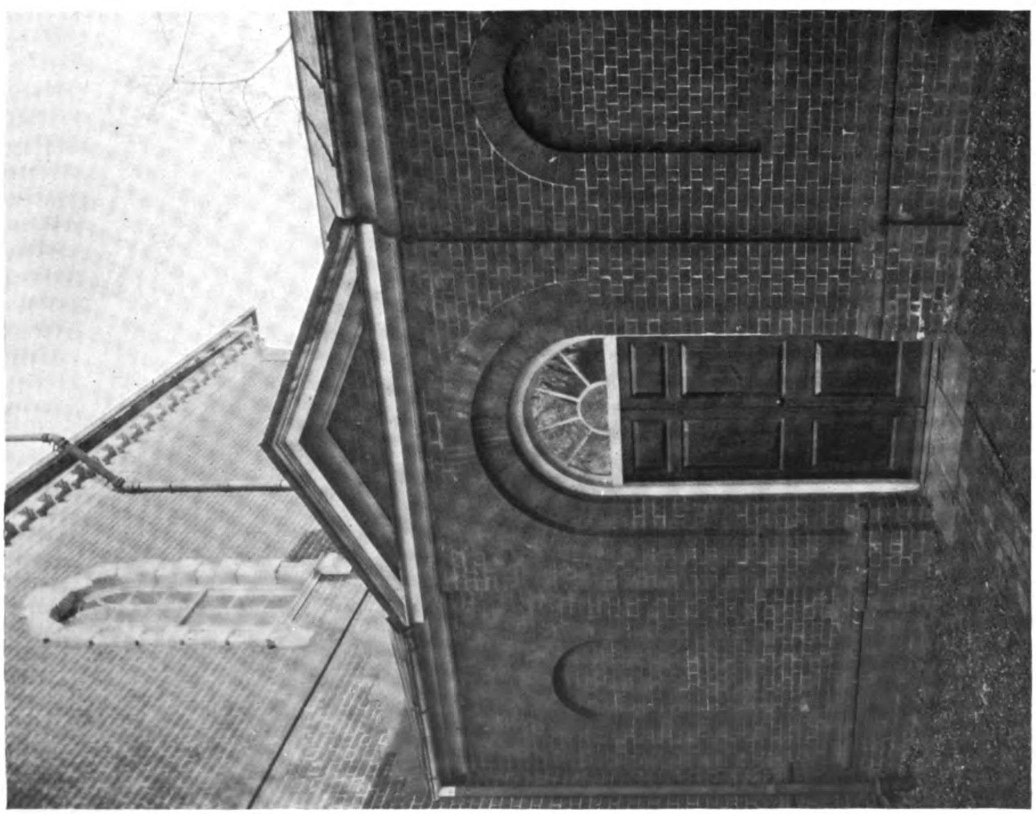
DETAIL OF DOORWAY

DINING ROOM, HARWOOD HOUSE, ANNAPOLIS



MEASURED DRAWING BY J. FREDERICK KELLY

GARDEN DOORWAY



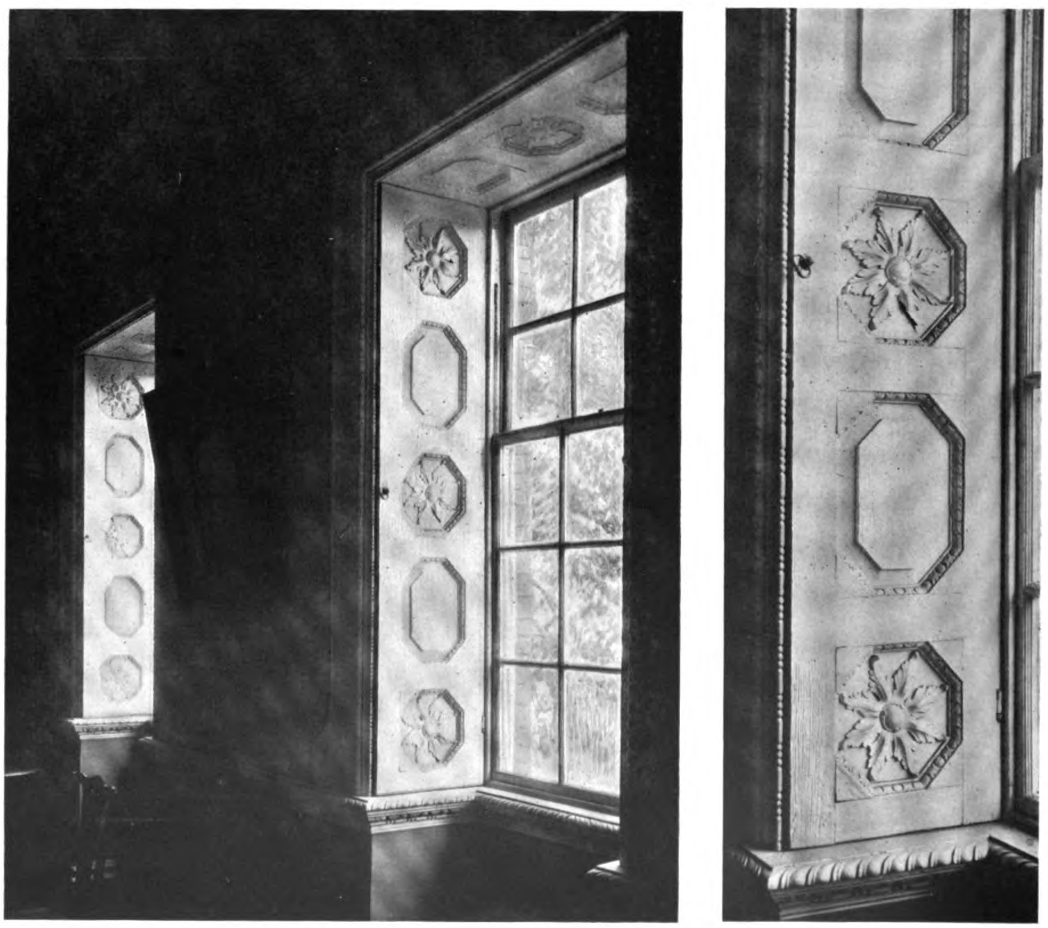
GALLERY BETWEEN PAVILION AND WING

HARWOOD HOUSE, ANNAPOLIS

invention when they plan a rectangular mass, provide the elevation with certain perfunctory penetrations, and then append a complement of hackneyed details that convention prescribes. To view the classic mode as a stereotyped medium excusing the exercise of ingenuity on the part of the architect is the height of folly. As a matter of fact, there is just as much scope for inventive originality in the domestic classic style, practiced in England and America, as there is in any other form of architectural expression. To be convinced of this one need only study thoroughly the domestic architecture of England and America from the latter part of the seventeenth century to the early years of the nineteenth. Such an example as Harwood House helps to bring this truth home to us.

If it be urged that a compact plan is demanded by a majority of clients and that compliance with this requirement militates against diversified composition, we submit that the objector may find some food for profitable thought in a perusal of the volumes published by Crunden, Plaw, Pain and others about the beginning of the nineteenth century. No one would think for a moment of adopting their plans as they stand, but the plans are susceptible of rearrangement to suit current needs, and they were made for houses in which considerable diversity of composition was achieved.

In another respect a critical scrutiny of Harwood House will repay the reader. The street front is distinctly mid-Georgian in its dominant characteristics. The only conspicuous suggestions of the late Georgian manner are the partial-octagon ends of the wings and the dimensions of the windows with their system of glazing. Even in this latter particular there is a departure from cut-and-dried usage in the employment of moulded sills. In the garden front we find a distinct reversion to a much earlier type of design, reminiscent of the restoration-Queen Anne manner, with the rectangular-headed door, the pilasters extending the full height of the facade, and the vigorous entablature with its torus frieze. And yet no one can deny that the ensemble is singularly harmonious and seemly. In other words, the architect did not find himself trammeled by any lack of elasticity in creating an orderly expression of classic methods. Here is something for hidebound purists to ponder over.



Details of Windows and Shutters, Dining Room, Harwood House

Concrete Construction

IV. DESIGN CONSIDERATIONS

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

CONCRETE designing is complicated compared with that of the average wood or steel framing. To teach any man to design concrete is not within the scope of a magazine article, but it is of interest to the student of concrete, as well as to the architect who must use it, to compare the designing of concrete with that of wood and steel and to consider a few practical points in the designing of concrete details.

There are two reasons in particular for the complications of concrete design. First, concrete framing is monolithic, that is, its beams are continuous and are rigidly attached to the columns. It is true that a steel skeleton is riveted together into a rigid frame, but for reasons to be further explained beams and columns are considered as merely supported excepting when designing for wind stresses in tall structures. The second complication is due to the fact that two materials are used together. Concrete construction has brought about the common use of the continuous beam theory in this country. The principal assumptions behind this theory are: (1) a constant moment of inertia, and (2) level supports. The first assumption does not hold true in concrete, but it causes a variation of not ordinarily over 10 per cent. The second assumption involves the reason why concrete beams are designed as continuous and steel beams are not. The variations of external moment and shear with small differences in the height of supports are large. A variation of a fraction of an inch may double the stress. It is not possible in ordinary construction to adjust supports for rigid, shop-fabricated steel with sufficient precision to insure absolutely uniform bearing on all supports. With concrete, on the other hand, the supports are automatically leveled by the pouring of the concrete in a plastic state.

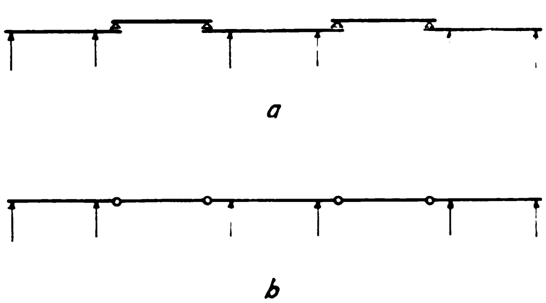


Fig. 1

The moment over the supports of a continuous beam is commonly called "negative," which is just by way of saying that beam action is the opposite of that in a simple beam, the tension being at the top and the compression at the bottom. The cantilever or beam with one fixed and one free end illustrates the most common case of negative moment. The continuous beam is in effect the same as the cantilever construction often used in bridges. (See Fig. 1a). The simple beam between the ends of the cantilevers can obviously be lighter than if it spanned the entire distance between supports. If the cantilevers be made a proper length and a hinge introduced at the ends, as shown in Fig. 1b, the whole structure becomes a continuous beam.

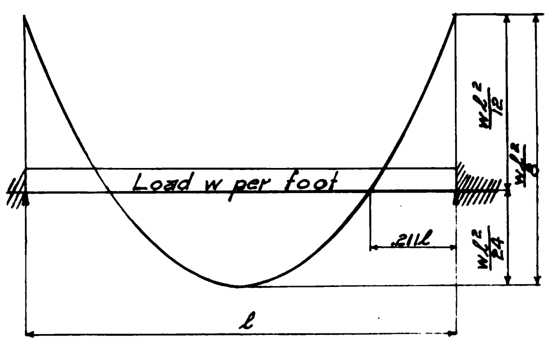


Fig. 2

The cantilever portions have negative moment and the central spans have positive moment. The hinges are the "inflection points," so called, where there is no moment.

The variation of moment in a uniformly loaded beam with fixed ends is shown in Fig. 2. An interior span of a continuous beam having many spans is the same. For comparison, the moment curve of a simple beam is shown in Fig. 3. The maximum moment in this case is given by the familiar formula, $\frac{wl^2}{8}$. The fixed or continuous beam has the same moment curve, but it is lifted up and shows a negative moment at the support of $\frac{wl^2}{12}$ and a positive moment in the center of $\frac{wl^2}{24}$.

The only way in which the negative moment can be greater than as computed is by a lifting of a support. Outside the earthquake belt this does not ordinarily happen, hence the common use of $\frac{wl^2}{12}$ for negative moment at interior supports of continuous beams, with equal spans. The settlement of a support, on the other hand, may occur through the unequal settlement of foundations or by the deflection, under load, of supporting girders. Such settlement will increase the positive moments. For this reason most design specifications and building laws call for $\frac{wl^2}{12}$ at the center of the span as well as at the support. This is a rather high excess factor

of safety, and the recently published Joint Committee Specification allows $\frac{wl^2}{16}$ for positive moment in certain cases where beams and supports are monolithic. It will be some time, however, before this is embodied in building laws. Similarly, the moment at the center of end spans and at adjacent supports is $\frac{wl^2}{10}$.

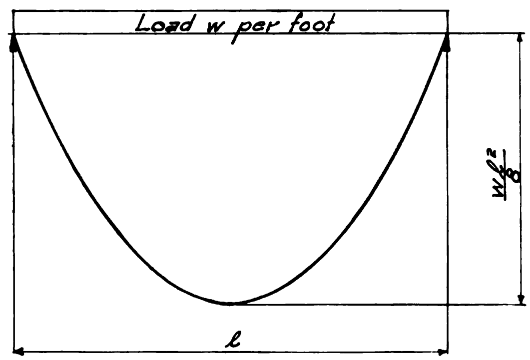


Fig. 3

Most concrete framing is continuous for several spans, and the approximate sizes of members for normal conditions, which everyone connected with the building industry carries in his mind, are based on conditions of continuity. In the unusual case of a single span, therefore, allowance must be made for a 50 per cent higher moment and consequent increase in size of members.

In all the designing thus far dealt with, equal spans are assumed as well as uniform loads. When spans are not equal, the case is much less simple. The longer span has greater relative effect, so much so that a short span between two long spans, as is common in schoolhouse construction, may have negative moment through its entire length. The shape which such a beam will take under load, together with its moment curve, is shown in Fig. 4. The theorem of the three moments, on which the continuous beam theory is based, and also the results of its application to a variety of cases, are given in standard text books. For anyone not experienced in concrete design to apply published data to specific problems, however, is, to say the least, a tedious process.

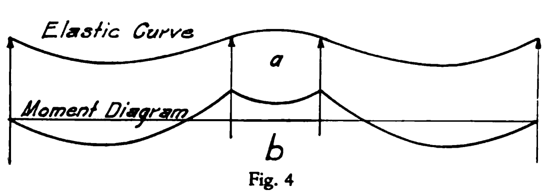


Fig. 4

Reinforced concrete is a combination of concrete to take compress on, with steel to take tension. The two materials have nearly identical coefficients of expansion, which makes their combined use a possibility. One of the first points which differentiates concrete design computations is the neutral axis. Instead of coinciding with the axis of symmetry the neutral axis of a reinforced concrete beam is a function of "n" (the ratio of the moduli of elasticity) and "m" (the ratio of the fiber stresses). It is approximately three-eighths of the depth from the compression side, with the commonly used stresses.

Beams are designed for shear and moment, and it may be of interest to compare the distribution of shear and moment in a concrete beam with that of the more familiar wood and steel. The straight line distribution of direct stress intensity, due to bending, as shown in Fig. 5, varying from zero at the neutral axis to a maximum at the outside fibers, is familiar to all. The total stress curve on the projection of any cross section will be the unit stress at each point multiplied by the corresponding width. In a concrete beam, the stress in the reinforcement w ll be further multiplied by the ratio of the moduli of elasticity. Fig. 6 shows the variation of total stress on a projected cross section for a rectangular wooden beam, a steel I-beam, and a rectangular concrete beam.

The horizontal shear between any two beam cross sections must balance the difference in direct bending stress at the two sections. It varies with the difference between the total stress curves, as shown in Fig. 7. It will be zero at the outside fiber and increase by decreasing increments to a maximum at the neutral axis. These curves are shown with the direct stress curves in Fig. 6. In ordinary concrete design, tension in the concrete is neglected as shown by the case in Fig. 6c. Actually, the concrete does take tension for a short distance below the neutral axis, and the curve shown in Fig. 8 is nearer the truth than those in Fig. 6c. The ordinary assumption is on the safe side and involves only a very slight error.

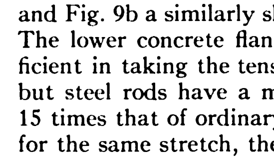


Fig. 5

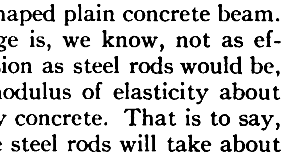


Fig. 7

A further analogy between a typical concrete beam and the familiar plate girder is also interesting. Fig. 9a shows a typica plate girder section, and Fig. 9b a similarly shaped plain concrete beam. The lower concrete flange is, we know, not as efficient in taking the tension as steel rods would be, but steel rods have a modulus of elasticity about 15 times that of ordinary concrete. That is to say, for the same stretch, the steel rods will take about 15 times as much stress as the concrete, so that the concrete tension flange can be replaced by steel of one-fifteenth the cross section. The result of such substitution, as shown in Fig. 9c, is a typical T-beam section.

In the plate girder, the pitch of the rivets connecting the flange to the web is computed as a function

of the horizontal shear. On the tension side of the concrete beam, this same shear is spread over the surface of all the rods instead of over rivet cross-sections, and is the bond stress.

The horizontal and vertical shearing stresses near the support of any beam have resultants at 45°

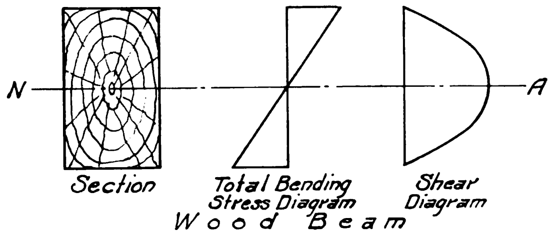


Fig. 6a

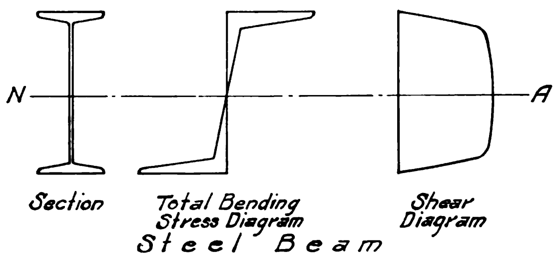


Fig. 6b

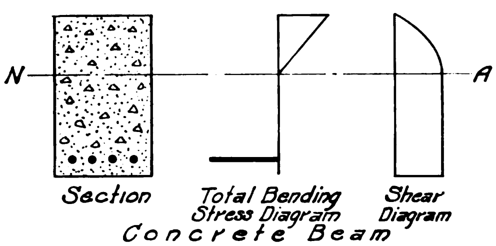


Fig. 6c

with the axis, one tension and the other compression, as shown in Fig. 10. The web of a steel girder is ample in tension but is weak in compression, on account of its slenderness, so stiffener angles are used. The web of a concrete beam is strong in compression, but weak in tension. Stirrups, analogous to stiffener angles, are therefore used. In the cases of both stiffeners and stirrups there are formulæ for computing the spacing, and many designers prefer to use them at a nominal spacing even when computations do not show them to be necessary. It is this diagonal tension in concrete webs which is critical rather than shear, which merely furnishes a measure and a colloquial name for diagonal tension.

Compression reinforcing in beams is not economical, since the steel can take a stress only equal to that in the adjacent concrete multiplied by the ratio of the moduli. There are certain places in which it is commonly used, however. At the supports of T-beams where the flange is on the tension side, it is usually cheaper to continue some of the bottom steel a few feet than to haunch the beam. It sometimes happens, also, that openings close to the side of a T-beam cut into the required flange width. In such a case, using compression steel to make up the difference is a satisfactory solution of the problem.

In rectangular beams the shear is usually low, since the web is full flange width. Since a slab is simply a rectangular beam of relatively great width, its design is usually a matter of moment computations only. Walls are merely slabs set on edge and their design is the same.

Reinforcement in concrete columns changes in length only as the concrete changes, since the two materials adhere rigidly. The stress in the steel is therefore limited to "n" times the concrete stress, as in the case of compression steel in a beam. Reinforcement is usually more expensive per unit of load carried than concrete. Other considerations are involved, however. Most building laws require at least ½ per cent of vertical steel as a factor of safety against stray bending moments, and the item of floor space is important in considering the cost. This will often make economical the use of the maximum allowable amount of steel—up to 5 or 6 per cent. Vertical rods are tied together with separate hoops or enclosed in a spiral cage. The spiral adds to the strength of the column, and an allowance is made for it in design specifications. Rich mixtures, with high allowable stresses, are often used in columns. Considerable study of typical columns is desirable. Various designs must be made, considering different mixtures of concrete, spirals or hooping, percentages of vertical steel and the value of floor space taken by the various sections, in order to arrive at the most economical design for a given case. Concrete columns are round or square in section. In a fire, the corners of a square column spall and tend to reduce the section to circular. Furthermore, circular columns are cheaper when metal can be used. Wall forms must

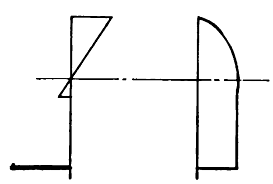


Fig. 8

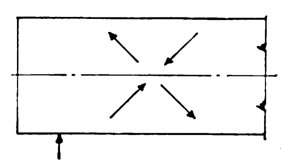


Fig. 10

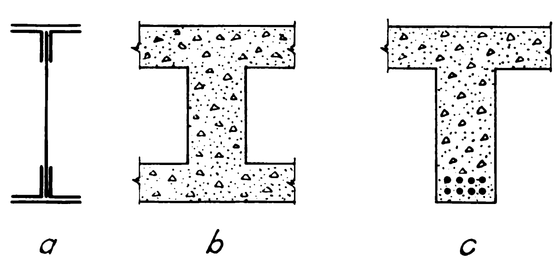


Fig. 9

usually remain square or rectangular. Exterior columns, in monolithic construction, must be designed for bending moment as well as direct stress. The designing of a reinforced section for combined bending and direct stress is a somewhat tedious and complicated process.

Ordinary spread footings are designed as two-way slabs. They are relatively short, heavily loaded cantilevers, so that shear and bond are usually the determining features of the design. Occasionally it is best to design footings as continuous beams; in such cases they are rectangular sections, no flange being available. Stirrups are never used in ordinary footings, for construction reasons, and in continuous footings only as a last resort. Miscellaneous structures such as pits, tunnels, machinery supports, etc. can be broken up for purposes of design into slabs, beams and columns. Their designing is a matter of carefully tracing stresses to see that they are all taken care of. This is particularly true in cases where failure to provide for a negative moment might involve cracks, objectionable on account of leakage or for some other reason, even though they are of no importance structurally.

In the detail designing of concrete, that is the economical arrangement of reinforcing rods, there are many considerations both theoretical and practical. In beams, since the inflection point moves somewhat with changing conditions of load, certain zones must be reinforced for both negative and positive moment. Ordinarily, part of the main reinforcing is bent up over the support from each side to take care of the negative moment. These rods, bent at an angle varying from 30° to 45° with the horizontal, also assist in taking the shear. The locations and angles of these bends or cambers must be such that there is sufficient tension steel at each section of the beam.

Stirrups are made in U- or W-shape with hooks at the tops for bond. In massive beams, where more than four legs are needed, it is better practice to use several Us in the same plane as shown in Fig. 11. Stirrups are usually ⅜ or ½ inch, occasionally ⅝ inch. Larger rods do not bend readily.

Spacers,—rods of which the principal function is to hold the main reinforcement in place,—deserve more attention from the designer than they sometimes get. In slabs, using ⅜-inch round rods about 2 feet on center, perpendicular to the main reinforcement, is good practice, and they are commonly used. They serve to distribute the load over the main reinforcing as well as to hold it in place.

Layers of rods in beams are separated by short pieces of 1-inch rod spaced about 50 times the diameter of the main steel, and with at least two under the shortest rod of the top layer. In general, it may be noted that placing concrete is a somewhat vigorous job, and reinforcing bars must be rigidly secured if they are to hold their places during the process.

Splices of reinforcing rods are necessary in certain members. They are never made in beams, but top rods are usually lapped to give sufficient tension steel, and bottom rods as already said are lapped for compression. Column rods are usually spliced every story,—at the floor for interior columns and at the floor or at the top of upstanding spandrels for exterior columns. The practice of butting column rods in a sleeve is largely obsolete, but rods from the lower section, equivalent to the rods in the upper section, should extend above the joint a sufficient distance for bond. Splices in all vertical members should be so arranged that the upper rods can rest directly on a construction joint. Where column rods rest on footings, steel bearing plates are sometimes used. Much more common is the use of stubs, which are rods just long enough to extend the necessary distance for bond above and below the joints. Stubs are also used in other places, such as where the change in column or wall section is too great to satisfactorily offset the lower rods, or where a column or wall rests on a beam.

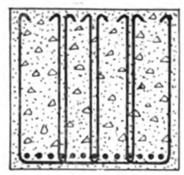
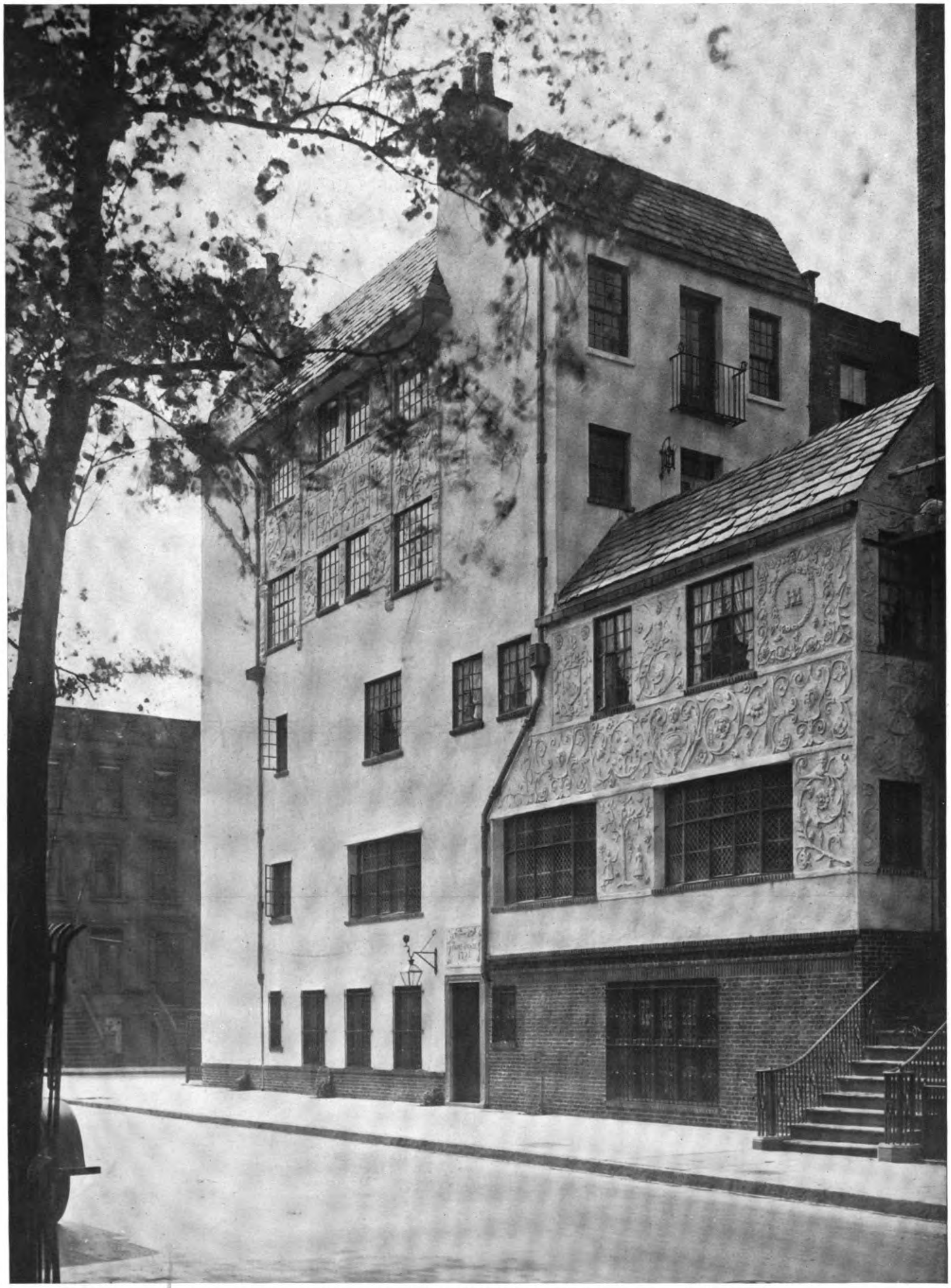


Fig. 11

Detail of large concrete beam showing recommended practice of using several U-shaped stirrups in one plane

Construction joints often need to be looked into, particularly in substructure work where the joints often take considerable shear and where there is danger of leakage. The necessary cover around reinforcing, for fireproofing, is specified in most building laws, but this sometimes needs to be increased where the fire risk is great. Allowance should also be made for irregularities in the placing of reinforcing in such places as large spiraled columns where work of great precision is seldom obtained, and when the amount of cover has been determined upon, definite means should be used to insure just this cover. The practice of laying reinforcing on the forms and hooking it up as the concrete is poured cannot be too strongly condemned. The result is either a floor stronger than was planned structurally, but with almost no protection against fire, or (more often) a floor reduced in strength, sometimes as much as 50 per cent, by cutting down the effective depth.

Most important of all to remember about concrete is that the details "make or break" the design. Allowing the lowest bidder to detail reinforcing as he sees fit is dangerous to the reputation of the architect and often unfair to the better grade of contractor. Furthermore, as the committee of the A. F. of E. S., appointed by Herbert Hoover, says in its report on Waste in Industry: "Not only must the bidder include the cost of the design in his proposal, but he must allow in addition an overhead to cover the cost of similar designs he made for unsuccessful bids. This duplication of design is waste, for which the owner must eventually pay."



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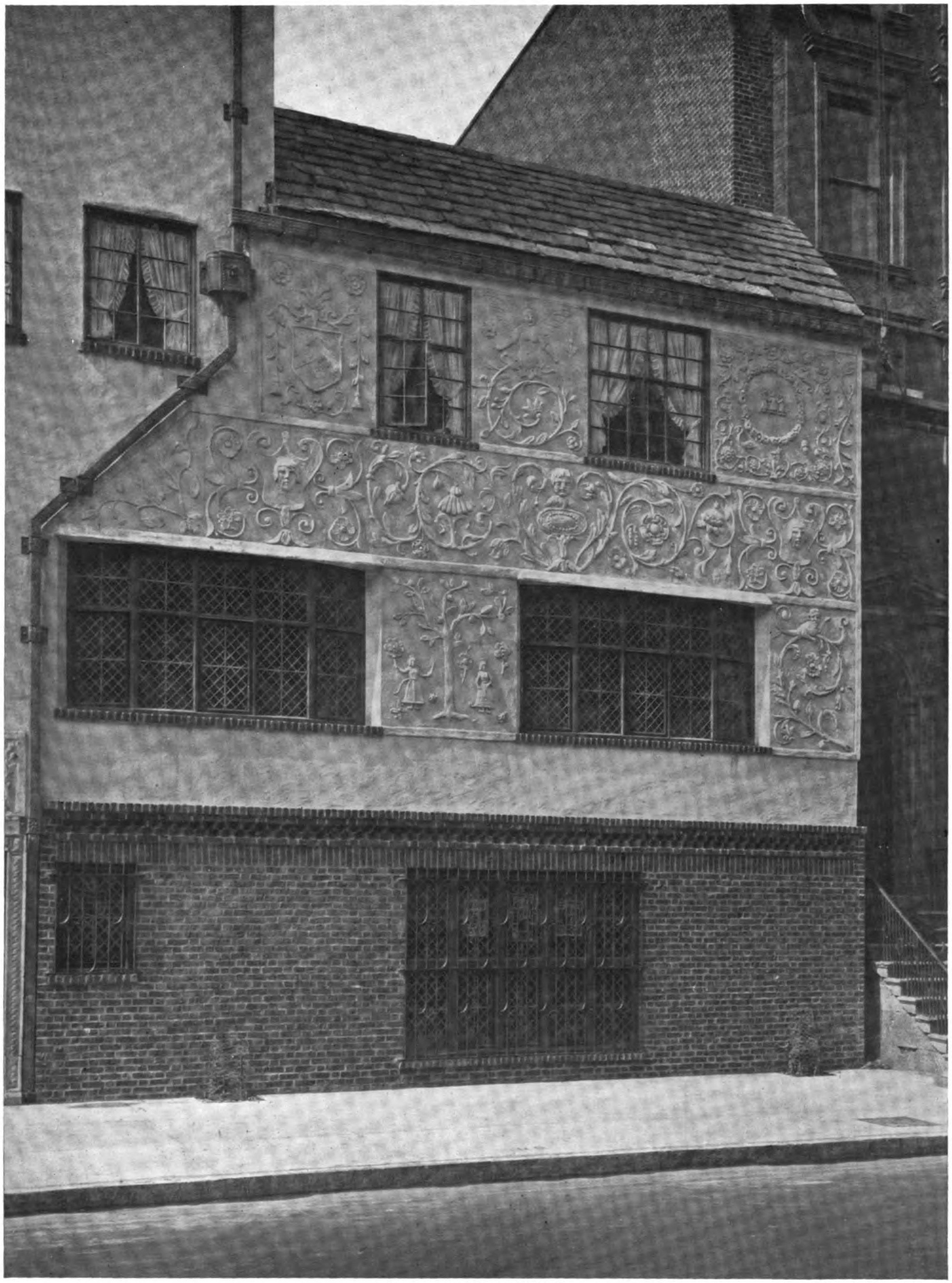

DETAIL OF PARGE WORK

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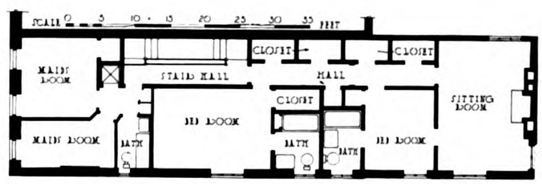
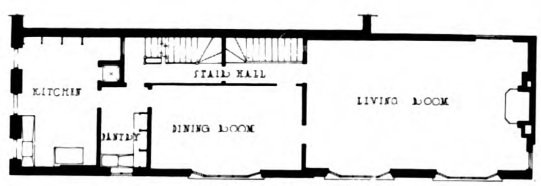
LIVING ROOM

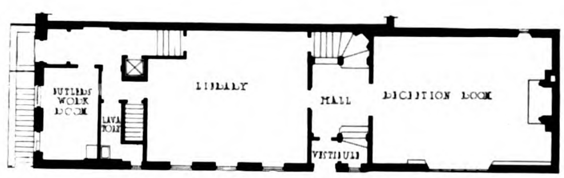
DETAIL OF LIVING ROOM FIREPLACE



SECOND FLOOR PLAN



FIRST FLOOR PLAN



GROUND FLOOR PLAN

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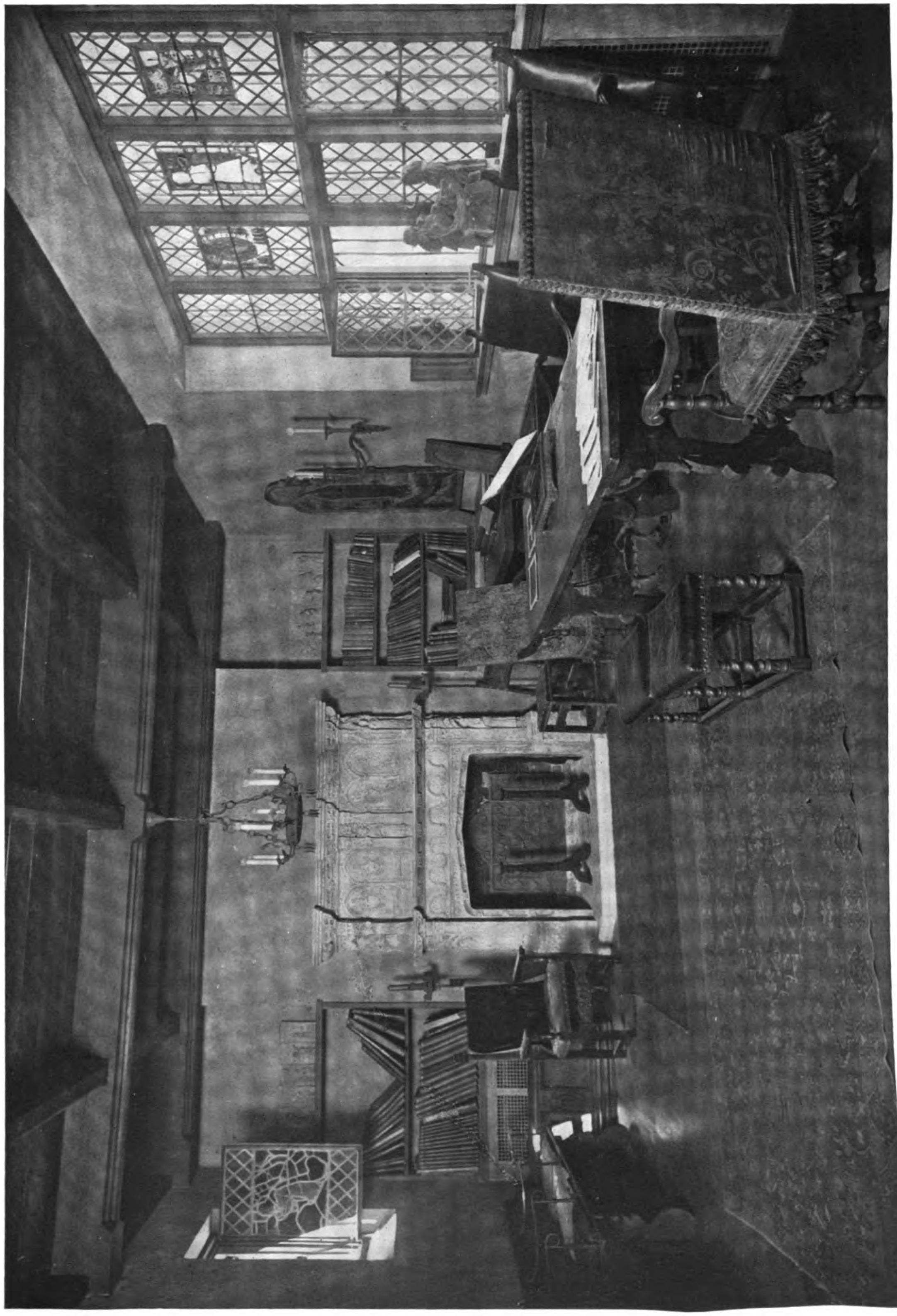

RECEPTION ROOM

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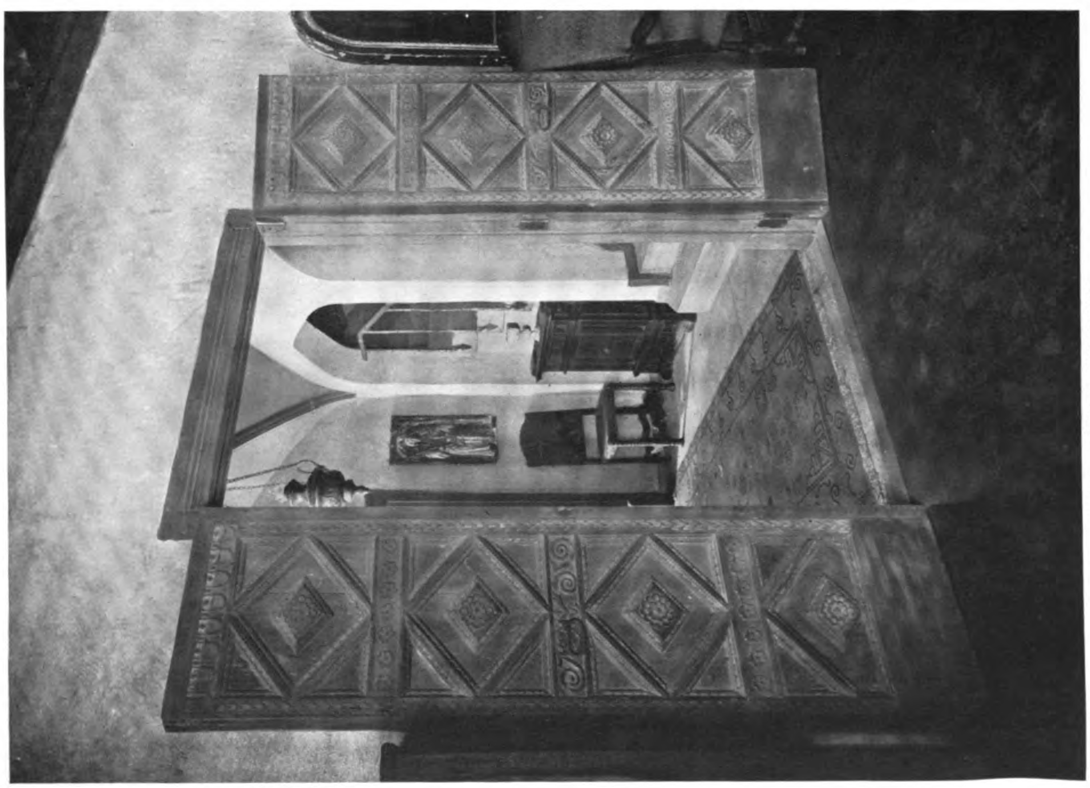
DINING ROOM



RECEPTION ROOM DOORS

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BUSINESS & FINANCE

C. Stanley Taylor, *Associate Editor*

The Co-operative Ownership of Apartment Buildings

II. PROMOTING AND FINANCING CO-OPERATIVE PROJECTS

ABOUT two years ago several articles were published in THE ARCHITECTURAL FORUM on the subject of co-operative ownership. These articles developed an unusual response, indicating the interest of architects in this subject. As the result of the information provided in these articles and in the answers to numerous inquiries several projects of this nature were actually constructed.

The Editors have recently received a number of further inquiries on this subject. In view of this interest and the fact that there have been a number of interesting developments since the original articles were presented, it is proposed to present a series of three articles covering the subject as adequately as possible. The first of these articles was presented in the July, 1922 issue under the heading:

"*Methods and Principles of Joint Ownership.*"

This is the second of these articles. The third (to appear in November) is:

"*Recent Examples of Successful Joint Ownership Projects.*"

Inquiries are invited from architects interested in the development of co-operative apartment buildings, and a special service is offered to readers for suggestions regarding specific problems.

THE various problems involved in the promotion and financing of co-operative apartment buildings are naturally complex, because they involve not only the financing problems of any building venture but in addition the formation of a group of tenant-owners. These prospective owners and occupants of the building must be satisfied from every angle that the project will be successful, and a definite ultimate cost must be guaranteed in order to induce the necessary investment.

There are two plans under which all co-operative buildings are promoted. The first is a plan under which a group of tenant-owners, who will occupy approximately 60 per cent of the building space, is formed for the purpose of providing the necessary cash equity. In this type of operation it is proposed that the balance, or 40 per cent, of space shall be rented at rates providing a profit which will cut down the actual cost of occupancy from the viewpoint of the tenant-owners. Experience has shown, however, that the more successful plan is that known as "100 per cent tenant-ownership," in which no rentable space considerations are involved.

The question of actual promotion of this type of building venture is one which we shall treat briefly. The complete functions of the promoter of a co-operative building are:

1. To select a suitable tract of land and place it under option for purchase under a long-term contract.

2. To decide upon the type of building and to have sketch plans drawn which present the project in an understandable and attractive manner.

3. To submit the project to a mortgage loaning source in order to determine approximately the amount of the building and permanent loan which can be obtained on the property.

4. To ascertain the cost and to take contractors' bids (having complete working drawings and specifications prepared for this purpose) in order to determine the exact cost of the building.

5. To organize a holding company, capitalized at the necessary equity which will include all costs of land and building, including the architect's fee, plus the expense of promotion, plus the promoter's profit, which must be kept within a reasonable limit.

6. To offer for sale stock in this holding company arranged in blocks according to the size and cost of each apartment in the building. Ownership of this stock will carry with it a 99-year lease which gives the purchaser the privilege of occupying a specified apartment at a specified owner's rental, which is his share of operating expenses, maintenance cost and any mortgage amortization on the building. The promoter estimates the operating charges and other costs in order to pre-determine this so-called owner's rental.

7. To handle the management of the building after it is constructed and have the accounts of the tenant-owners kept, or to arrange with an efficient real estate management firm or real estate manager to be certain that this work is done properly.

In order to demonstrate the method of presenting a project of this nature to prospective tenant-owners an outline prospectus for such an operation is offered for consideration. This is the prospectus of a new building now being promoted and built by the Joint Ownership Construction Company, Inc., New York, of which Frederic Culver (member of the Consultation Committee of THE ARCHITECTURAL FORUM) is president.

An analysis of the presentation will provide interesting data.

Financial Plan

955 Lexington Avenue, Inc.

Consideration to be Paid for Land and Building

*Equity represented in stock	$430,000
1st mortgage	265,000
Total cost of operation	$695,000

*Note: $15,000 in cash realized from sale of this stock will be set aside for working capital and surplus fund, and deposited to the credit of the company.

Estimated Operating Expenses of Building

Interest on $265,000 mortgage at 6 per cent (Expect to obtain this loan at 5½ per cent)	$15,900
Insurance	740
Taxes	10,710
Coal	2,475
Operating force	10,080
Water, light and power	2,060
Management	1,395
Supplies	950
Contingency fund	715
	$45,025

Description of Proposed Building

"The building will be a fireproof structure, 11 stories in height and modern to the last degree. It will contain 35 apartments and 13 extra servants' rooms or other utilization of this space on the roof, and can be completed in ten months from the time the foundations are laid, barring strikes or other unavoidable delays. The exterior will be of a Georgian type of architecture, of brick with marble or limestone trim, giving an air of quiet dignity and character to the structure not found in the usual apartment house. The individual suites are planned with a view to light, air, closets, no waste space and elimination of useless ornamentation. There will be an open, wood-burning fireplace in each living room. Changes in the plans can be made if desired to suit the individual needs of the owners, within certain limitations."

The "Culver Plan" of 100 per cent joint ownership, in brief, is thus explained:

"A corporation known as 'No. 955 Lexington Avenue, Inc.,' is formed in which title to the property is vested. The stockholders in this corporation are the occupants of this building. This gives each tenant-owner an interest in the entire property and entitles him to a 99-year lease on the apartment he selects; this lease, together with his stock, gives him virtual ownership of this apartment. Every apartment in the building is sold; there is no space reserved to rent, and therefore speculating in the renting of apartments and carrying vacancies is eliminated, for each individual owner pays his pro-rata share of the operating expenses of the building."

Information as to the organization and financing of co-operative building projects can best be given by concrete examples. We have already presented the outline of a plan for a fairly expensive type of building. We quote here from a letter recently written to an architect by the Service Department of THE FORUM which gives data covering a promotion of an apartment building of less expensive type. The architect in question sent to THE FORUM an inquiry as to how he might proceed in the development of a co-operative apartment building having twelve 4-room apartments, six 5-room apartments, and six 6-room apartments. His estimated cost of land and building together with other details will appear as referred to in our letter in reply:

"Fundamentally, there are two methods which have been found satisfactory in financing such a project. Both of these involve, first, the obtaining of a first mortgage. On your project, which has a total appraised valuation of at least $135,000, it should not be difficult to get a first mortgage of $75,000, details of which we will explain later. This leaves a necessary equity of $60,000 to complete the purchase of land and construction of the building.

"You may proceed in two ways from this point. The first is to enlist the interest of one or two speculative investors who will put up the necessary $60,000, having in mind the sale of this building to a group of tenant-owners (see July, 1922 issue of THE FORUM which contains an article on this subject) at a profit of $15,000 or $20,000; or, second, to sell stock directly to the tenant-owners without bringing in the speculative investor. We will outline here the method of financing without the speculative investor, but if such an investor is brought into the situation and the building is not sold on a co-operative basis, until its construction is completed you would use the same system but add to the cost of the building whatever profit the speculative investor wishes to make.

"Proceeding, therefore, on the assumption that you can directly interest a group of tenant-owners, this is the most efficient procedure: You need $60,000 (or whatever the equity is after obtaining first mortgage) to complete this operation. In addition to this you need some money for promotion expenses in selling the stock and probably also to cover the architect's fee. We should, therefore, immediately incorporate a company having a capital stock of $70,000 in the form of 700 shares at a par value of $100 each—all common, non-assessable stock. This stock should be divided into groups according to the sizes of the various apartments, and the purchase of a block of stock carries with it a perpetual lease or a 99-year lease, at an estimated owner's rental which is paid by the tenant-owner in sufficient sums to cover costs of operating and maintaining the building. For the building which you describe you would have 24 stockholders in about these proportions:

Six stockholders purchasing $3,500 worth of stock each and giving each the tenancy of a 6-room apartment	$21,000
Six stockholders purchasing $3,000 worth of stock each and giving each the tenancy of a 5-room apartment	18,000
Twelve stockholders purchasing $2,500 worth of stock each and giving each the tenancy of a 4-room apartment	30,000

The total amount of money provided in this way is, $69,000 leaving a balance of $1,000 of stock in the treasury.

"If this stock is sold as it probably will be, before the building is started, each stockholder should pay for his block of stock approximately thus:

10 per cent on signing the stock purchase and lease agreement.

15 per cent upon call when you are ready to begin excavation and complete payment on purchase of land.

25 per cent when excavations and foundations are completed.

25 per cent when the roof is on, and the balance when the building is completed. In other words, these payments are made on terms similar to those of a building loan.

"By providing $69,000 in this way you have arranged for the necessary equity of $60,000 and you have a fund of $9,000 to cover promotion expense and the architect's fee. Before stock can be sold it is quite necessary that working drawings and specifications be completed and a lump sum contract be agreed upon so that you can guarantee to these stockholders that they will not be called upon for additional money because of excess building costs. Without this feature the whole scheme is useless.

"The general method of establishing the owner's rental and carrying out the management of the premises is completely outlined in the current issue of THE FORUM (July, 1922) and other details will follow in September and October.

"It has been found unwise to sell stock covering some of the apartments and attempting to rent the others. The successful co-operative apartment house is a complete joint tenancy building.

"The best kind of a first mortgage to get on this building is a loan covering a period of about ten years under an agreement to pay off at the rate of 10 per cent a year. This cost of 10 per cent can be added to the owner's rental or arrangements made to pay off only a part of the mortgage over this period, reducing the amount necessary for the tenant-owners to put up in addition to their first stock investment."

Another interesting method of promoting less expensive building types has been developed by The Queensboro Corporation of New York. This method differs from others described in this article

in that the promoting company employs sufficient capital to complete the buildings before offering tenant-owners stock. We give a description of the method employed by The Queensboro Corporation.

The land is purchased from the land company and an architect is commissioned to draw plans. A building loan and first mortgage is arranged on each building, usually with a bank, trust company or the loaning department of a life insurance company. The buildings are constructed through the purchase of materials and the placing of sub-contracts directly by the owning company. After a building is completed, so that its exact cost is known, the owning company adds its legitimate profit to establish a definite selling price for the entire building. The difference between the first mortgage and this selling price, or in other words the equity amount, becomes the amount of capitalization of a co-operative tenants' corporation which is to own this individual building and which is limited by the terms of its charter to the ownership, maintenance and improvement of a specific plot of ground and the building thereon. This provision is made to prevent any chance of speculation with the corporation's money.

Having in this manner incorporated the equity in the building, stock is offered for sale to prospective tenants. The amount of stock purchasable depends on the number of rooms contained in the apartment which the tenant proposes to occupy. Under this plan all apartments are occupied by stockholders. There is a considerable difference at this point, however, between the principles of this operation and those of the average co-operative development. In the first place, the ownership of stock involves only a right to occupancy of the specific apartment on yearly lease by the *original purchaser*. This lease is renewable annually as long as the stockholder wishes to occupy the apartment.

Details of a Typical Investment

In order to demonstrate clearly the exact financial operation of this transaction we give a complete financial outline of a typical purchase in any one of these buildings. The transaction is thus described: A conservative first mortgage has been placed on the building, averaging approximately $800 per room. A purchaser of a typical 5-room apartment pays approximately $10,500 on an easy-payment basis. Of this amount, at the rate of $800 a room, $4,000 is in the form of a first mortgage, leaving an equity of $6,500 which he must pay. He is called upon to provide only $2,000 in cash, leaving an unpaid contract balance of $4,500.

The tabulation here shows how this $4,500 is paid off. It will be noted that the monthly payment of $134 is fair market value for an apartment of this class, but out of this amount $35 is directly credited as an installment payment, and the dividends out of the monthly rental of $99 are credited to the account of the tenant-owner. Thus in the fourth month of the seventh year, after paying a normal rental over this period and enjoying all community advantages, he is the owner of a valuable equity.

Equity	$6,500	Monthly rental	$99
Cash	2,000	" installment	35
Contract	$4,500	Total monthly	$134

With an initial cash payment of $2,000, monthly rental of $99 and monthly installment of $35 on contract, and crediting the estimated dividends on the equity at 7 per cent, the entire stock equity will be paid in six years and four months.

Year	Installments		Estimated dividend @7 per cent		Gross credit		Interest (deduct from gross credit)		Net credit	Total credit on contract end of each year
1st	$420	+	$455	=	$875	−	$270	=	$605	$605
2nd	420	+	455	=	875	−	234	=	641	1,246
3rd	420	+	455	=	875	−	195	=	680	1,926
4th	420	+	455	=	875	−	154	=	721	2,647
5th	420	+	455	=	875	−	111	=	764	3,411
6th	420	+	455	=	875	−	66	=	809	4,220
4 mos. of 7th	140	+	152	=	292	−	5	=	287	4,507

These credits, with the $2,000 initial payment, will pay in full the stock equity of $6,500. After the equity is paid, monthly cost is:

Rental	$99.00
Dividend (estimated at 7 per cent)	37.92
Net monthly cost	$61.08

A feature of this plan is an agreement whereby all stock purchased is held by the original owning company for a period of five years. This obviates the necessity of placing a second mortgage on the property, and as this owning company (as later explained) has a contract to manage the property, it is evident that if it does not so manage that the dividend is 7 per cent, as estimated, it in turn must have its money tied up over a longer period.

All apartments are occupied by stockholders, with the provision that if a stockholder finds it necessary to move he may give notice in July and vacate the apartment October 1 of any year. He is no longer liable for the rental, and while he still maintains his stock ownership and receives dividends accordingly, the apartment is actually rented to a tenant by the owners' corporation, of which his stock ownership is a part. Conversely, stock ownership other than the original purchase does not carry with it a right to occupy an apartment. The stock owner may sell his stock to whom he pleases at any price he can get, but the new purchaser of the stock must receive the approval of the owners' committee before he can personally occupy the apartment in question.

When the stock of an individual building has been sold the title to the land and building passes to a company composed of the tenants. The Queensboro Corporation makes a contract to manage the building for a period of ten years with an option on the part of the tenant-owners to renew for a like period. As this organization has had extensive experience in management and has large purchasing power it is quite evident that such management

will be more efficient than an amateur attempt at building management by a committee of tenants.

As already explained, the basic elements of co-operative building ownership do not preclude the application of this principle to moderate cost buildings, excepting in the limitation of promoters' fees. In fact it might be said that as the inducement to the promoter is greater in developing high cost buildings it is but natural that activity should be directed chiefly toward expensive apartment dwellings. There is, however, a great need of studied application of the co-operative principle in the development of apartment units costing in gross figures not over $8,000 per family. In order to give some idea how a comparatively inexpensive co-operative project can be developed, it may be interesting to know of a simple development of this nature which is now being successfully carried out, insofar as the financing is concerned, and which promises to be successful from the tenants' point of view.

For the development of the operation in question it was first determined that in a rapidly growing industrial city there were a number of families who would be interested in buying apartments on the co-operative plan, provided the cash payment were not too high. It was further learned that as far as a building loan was concerned co-operation might be expected either from a financing corporation, definitely developed to aid in meeting the housing shortage, or from an insurance company which had set aside a certain amount of money to assist in solving the housing problem. The first step was to work out sketch plans and to outline specifications for an apartment building simple in design and equipped and planned to include every possible economy, but at the same time providing comfortable dwelling quarters for a class of people represented by the employes of local factories. Having determined that the elements of financing and demand could be definitely counted upon, the advancing of the necessary equity was undertaken by a group of men interested in meeting the local housing shortage.

The general figures on this project were worked out somewhat in this manner:

1. That a building should be constructed providing ten apartments averaging 6 rooms each at a cost of $6,500 per family, consequently making the total cost of the building $65,000. The building in question is a 4-story, walk-up apartment having simple modern conveniences.

2. That land suitable for the location of this building should be obtained for $5,000.

3. That a mortgage loan, bearing an amortization clause as later described, could be obtained, amounting to 60 per cent of the cost of land and building or 60 per cent of $70,000, being a building and first mortgage loan of $42,000, 20 per cent of which was to be paid off over a period of five years. This meant in simple figures that, adding a profit of $500 per family for those who financed the equity in this building, each apartment might be put on the market for purchase at $7,500 made up as:

Pro rata cost of building	$6,500
Pro rata cost of land	500
Pro rata allowance for profit	500
	$7,500

Of this amount the advancement of $4,200 as part of the building loan was assured, leaving an actual cost balance of the difference between $7,000 and $4,200, or $2,800 per family, this being the amount of equity advanced by the promoting group.

Having completed the details of the operation thus far a stock company was formed representing the equity in the sales price of the building,—the sales price as given being $75,000; the first mortgage being $42,000, and the original owners having agreed to allow a second mortgage of $15,000, to be paid off on an amortization plan by those who purchased stock carrying occupancy privileges in the building.

From the viewpoint of the buyer, therefore, an apartment in this building could be purchased for the gross price of $7,500 of which $4,200 represented a pro rata share in the first mortgage, and $1,500 represented a pro rata share in the second mortgage, which is to be paid off in five years. Taking this total of $5,700, it is found that the purchaser of an apartment must pay $1,800 in cash for which he receives one-tenth of the stock of the corporation, carrying with it the perpetual leasehold privileges for one apartment. Having paid $1,800, the tenant has assumed these liabilities which might be termed owner's annual rental:

Interest on first mortgage of $4,200 at 6 per cent	$252
Interest on second mortgage of $1,500 at 6 per cent	90
Amortization of 20 per cent of first mortgage over five years, or 20 per cent of $840	168
Amortization of second mortgage over five years	300
Pro rata cost of maintenance and service charges	300
	$1,110

In this total of $1,110 the items of $168 and $300, representing amortization payments, cannot be figured as actual rental, but are really installments on the purchase of the apartment and consequently represent savings. Therefore, the actual rental of the apartments approximates $642, or about $54 a month, which is actually decreased by the cessation of interest on the amortization payments until, at the end of five years, the owner of one-tenth of the stock, representing the tenancy of one apartment, actually pays as a rental charge:

Interest on reduced first mortgage, $3,360 at 6 per cent	$201.60
Second mortgage has been paid off	
Cost of maintenance and service charges	300.00
Owner's rental, after fifth year	$501.60

or approximately $40 per month, to which must be added any repairs which the owner may wish to make to his own apartment, as the owner always assumes costs of interior repairs and decoration in the co-operative plan.

No item is included, of course, as interest on money invested, as this interest is returned in the form of reduced rental cost.

Professional Bills and Accounts

By TYLER STEWART ROGERS
The Housing Company, Boston

ONE of the most important administrative details which is performed in the office of any business concern is the preparation of bills in payment for services rendered or goods sold. This one operation, though seemingly perfectly simple, is worthy of careful study, for it contains many pitfalls and dangers that threaten to steal away legitimate profits.

In commercial transactions the process is relatively simple, for generally there is a price fixed and known in advance to both parties which forms the basis of the charges billed. In professional work, however, such as that performed by architects, landscape architects or engineers, where the charges are frequently based upon the extent of service and only the rate of charge is known in advance, there are complications which require straight thinking to unravel. For purposes of this discussion let us represent all professional offices by a typical architect's office, for the underlying principles remain the same in all the various allied professions.

Theoretically, an architect conducts an office only when required to do so for the benefit of a client, in order to express by the medium of plans and writings his conception of the structure which the client desires. The client pays the architect for his concept and the supervision of its realization. In addition he pays the cost of the means necessary to arrive at the realization, either to the architect for the services of his organization, or to the contractor. Were it economical to do so the client might employ the architect for his "personal" professional services and have him prepare all the necessary plans and specifications by his own hand. However, it has been found less expensive for the architect to employ assistants to perform most of the actual preparation of the drawings, and for this reason only offices are established. Thus the draftsmen, specification writers and clerks, and the office furniture and equipment are all means to an end, and are solely for the benefit of the client. Consequently, the client must pay for these things as elements of cost in the accomplishment of his project. When several clients engage the same architect, he, still for purposes of economy, performs all his work in one office and divides the cost of this office among his clients in proportion to the amount of work he does for each; it is the process of determining and properly allotting expenses that constitutes the principal operation in the preparation of bills.

Expenses incurred in the conduct of an office may be divided into two major groups, labor constituting the first, and equipment including materials or supplies, the second. In order to properly account costs it is essential that these two groups be kept separate at all times during calculations. Each group of expenses may be separated into two other divisions, depending on whether the expense was incurred for the benefit of only one client or project or for the benefit of two or more; the first class would be called direct expenses and the second, indirect expenses.

We have now formed four groups, which together include all possible expense items. They are:

1. *Direct Labor Expense.* Time cards kept by the architect's assistants show the amount of time actually spent on each project in the office. The total of this time is the productive labor for the period under consideration. The cost of this time (all of which is divided apportionably among the various projects according to the time cards) constitutes the direct labor expense.

2. *Indirect Labor Expense.* The balance of the payroll which remains after deducting the cost of all direct labor expense constitutes the indirect labor expense. Examination will show that this balance was incurred for the benefit of several clients or all of the clients and hence its cost must be apportioned among the projects in proportion to the benefits derived therefrom by each. Typical expenses of this class are:

(*a*) Waiting time of draftsmen; that is, time not applied to active projects, due to lack of information, delays or lack of work.

(*b*) Vacation time, sickness or absence for any cause during which time the absentee is paid, yet which produces no benefits; some offices do not pay for such lost time.

(*c*) Labor given to general office work, such as stenography, filing, charting, cleaning up and other customary administrative work.

It will be noted that the first two groups are non-productive, while the third is productive labor. In order to assist in obtaining economical management it is often desirable to follow these costs separately, hence indirect labor expenses are sometimes subdivided into non-productive indirect labor and productive indirect labor.

3. *Direct Equipment and Materials Expense.* This group includes the cost of telegrams and long distance telephone calls, blueprints, photographs, models and other items purchased for the benefit of individual clients. Any expense item, to be included in this group, must be wholly chargeable to a single project.

4. *Indirect Equipment and Materials Expense.* This group takes care of all expense items not classified in one of the other three groups. It includes all items excepting labor items which, in the parlance of the accountant, have more than one beneficiary. Some of the typical expenses belonging here are:

(*a*) Rent, or its equivalent in replacement reserve

and insurance on building, and interest and taxes on investment in building and realty.

(*b*) Heat, janitor service, and building repairs if not included in (*a*).

(*c*) Equipment expenses such as replacement reserve, interest on investment in equipment, and insurance and taxes on equipment.

(*d*) Service expenses, such as electric lights, lamp replacement, towel and soap supplies, water coolers or filters, and drinking cups.

(*e*) Telephone service, excluding long distance calls chargeable to separate projects.

(*f*) Administrative expenses, including stationery and office supplies, postage, bad accounts and collections, federal and corporation taxes if any, dues to professional organizations, and miscellaneous (not direct) traveling expenses.

(*g*) Selling expenses, depending on the scope of sales operations as such, including advertising, sales traveling expenses, sales letters, and publications.

(*h*) Compensation insurance on employes, bonuses apart from wages, etc.

Excepting for administrative purposes these subgroups are all thrown together under the one general head. The terminology applied to the four main classes is descriptive rather than popular, for the use of the common terms such as "burden" or "overhead" would tend to confuse the discussion because of their ambiguity.

It is not within the province of this discussion to consider in detail the actual bookkeeping methods used to keep track of these costs. Suffice it to say that a method which clearly recognizes the four main classes of expenses will be the simplest of application in the long run and will make it possible to avoid many mistakes which are fatally easy to make.

Having collected the many expense items for the period to be billed, the process of sorting out and apportioning them begins. The direct expenses, of both labor and equipment, are readily separated and assigned. The problem comes in the distribution of the indirect expenses. The basis for distribution of indirect expenses is "in proportion to the amount of work done for each client," to repeat our own words. The amount of work done for each client is expressed in the number of productive man-hours expended on each project. Hence, *for each job, the ratio which the number of productive man-hours expended bears to the total number of productive man-hours* (expressed in per cent) *is the ratio in which all indirect expenses are apportioned* to the job. This is our basic theorem.

It is essential to apportion indirect labor expenses separately from indirect equipment and materials expenses, for otherwise the burden would be "pyramided," with the result that the distribution would be incorrect and incomplete, as illustrated farther on.

Following out this procedure, the direct labor is first set up against each project. Then the indirect labor is distributed as just described. The direct equipment and materials expense is then allocated, and finally the indirect equipment and materials expense is computed and placed. These four items added together make up the total cost of the work for each client. To this total is added whatever fee charge is due in accordance with the contract governing the case. It may appear that such steps are unnecessarily involved for actual practice, and that short cuts may be made by grouping the items together in some way. That such economies are unsound is best illustrated by examining the results obtained by other systems which do combine them.

The time honored method of taking care of "overhead," the system in use in the vast majority of offices today, expresses the total indirect expenses as a percentage of the payroll. That is, the indirect expenses are all added together and compared with the professional payroll, and the relation between the two is expressed as a percentage of the payroll. The payroll is distributed among the jobs as before, and to each job payroll is added the percentage thus found in dollars, which is called the "overhead" cost. Some offices, since their first beginnings, have religiously and blindly added 100 per cent to their payrolls to cover "overhead," regardless of whether this is ample or just.

Now suppose two jobs, widely different in character, enter such an office. The first is mere tracing and is assigned to a tracer who is paid $10 per week. The work lasts a week and the client is billed $10 for labor, plus $10 for overhead, plus whatever profit is made. Frequently, by the way, the profit too is computed as a percentage of the payroll cost. The other job requires the best skill available and is assigned to a man drawing $100 a week. This work also lasts one week and is billed to the client at $100 for labor, $100 for overhead, and a profit charge. During that week both the draftsman and the tracer occupy about the same amount of room and use the same amount of light, water, heat, towel and soap service and the other things which make up the indirect expenses for the period. Both work while a third man is on vacation and therefore bear the burdens generally supported by his work. But one man turns in $10 and the other $100 as his contribution to the total indirect costs or "overhead."

Were this sort of work to continue over long periods the dangers of the system would become quite obvious, especially if the work were mostly for the low priced man. The office would go bankrupt unless it raised its "overhead" charge to 200 or 300 per cent or more in order to return an amount sufficient to cover expenses. Furthermore, this plan makes the work done by cheap labor cost the client less, and that done by skilled labor more than the true cost, thus putting a premium on the better class of work.

A second example is well worth following, as it brings out other fallacies. In the same office circumstances compel idleness for a part of the force so that the productive time is but a fraction of the total. Let us assume that there are 1,000 man-hours in the period and that only 600 hours are

productive. Then let us suppose the total indirect equipment and materials expense to be $1,000, and the labor cost uniformly $1 per hour. Following the practice last described, the "overhead" would be computed at 100 per cent, for both the payroll and the indirect equipment and materials expense are $1,000 each. Three jobs are in the office; A using 250 hours, B using 200 hours, and C using 150 hours, totaling 600 productive hours. The bills would be thus computed, exclusive of profit and direct equipment expenses:

Client	Direct labor cost	Overhead cost	Total
A	$250	$250	$500
B	200	200	400
C	150	150	300
	$600	$600	$1,200

This leaves $800 unaccounted for, and too often the loss goes unnoticed. If noted, the architect might add the $400 of unproductive labor to the burden, making it $1,400, and then he would compute his bills again, using 140 per cent as his overhead charge, after this manner:

Client	Direct labor cost	Overhead cost	Total
A	$250	$350	$600
B	200	280	480
C	150	210	360
	$600	$840	$1,440

Again it is seen that the total is short $560 of the $2,000 which represents the total office expenses. Now if we follow the steps recommended in this discussion the calculations would be as given below. Note that for the sake of simplicity no direct equipment and materials expenses are considered.

Client	Direct labor cost	Indirect labor cost	Indirect equipment costs	Total
A	$250.00	$166.67	$416.67	$833.34
B	200.00	133.33	333.33	666.66
C	150.00	100.00	250.00	500.00
	$600.00	$400.00	$1,000.00	$2,000.00

At last we have arrived at a complete distribution of costs. The example chosen is exceedingly simple, owing to the condition of a uniform labor cost. The complete operation of the plan is more correctly conceived if we consider also the variation due to the difference in the cost of labor employed on each job. Let us assume that our 600 man-hours comprised the time of three men, one getting $1.50 per hour, another $1 per hour, and the third 50 cents per hour. Also assume that the cheapest man worked on job A, the dollar man on B, and the high-priced man on C. Under these conditions, the cost of the productive labor will amount to $550, and the unproductive to $450. Here is the situation in tabular form:

Client	Labor rate	Productive hours	Direct labor cost	Indirect labor cost	Indirect equipment and materials cost	Total
A	$0.50	250	$125.00	$187.50	$416.67	$729.17
B	1.00	200	200.00	150.00	333.33	683.33
C	1.50	150	225.00	112.50	250.00	587.50
		600	$550.00	$450.00	$1,000.00	$2,000.00

Here again we have distributed our total expenses, amounting as before to $2,000. But we have applied our indirect expense items in proportion to the amount of work done for each client, and not on the false basis of the labor cost of this work. The time element which enters into rent, light, insurance and such factors in the indirect equipment expenses is here recognized and used as the basis for apportioning those costs.

It is apparent from the first two examples that pyramiding burden charges is disastrous. It is of the utmost importance to check all calculations to make sure that all expense items are distributed. For this reason it is essential that a control ledger be incorporated as a part of the bookkeeping system. It may be in the form of a simple debit and credit ledger, showing all disbursements made and all credits received, during each invoice period. It would be convenient to have this ledger divided into four columns and a total, one column taking care of each of the four major divisions of expense. Then, when all bills are computed, their total expense items should equal the total disbursements of the control account, less any proper credits. Also the analysis of the expense items in the control ledger should balance with the same analysis of the bills. A form of proof sheet is given upon this page.

Conditions may arise where two or three projects, but not all *active* projects, benefit by certain expenditures. Under the general rules given these expenses are indirect. In order to distribute them equitably to the proper beneficiaries, and to avoid making them a burden upon the projects not concerned, it is necessary to set up supplementary classifications in addition to the four main classes of expenses. Thus jobs A, B, and F may be associated

PROOF SHEET

PROJECT	DIRECT LABOR	INDIRECT LABOR	DIRECT EQUIPMENT AND MATERIALS	INDIRECT EQUIPMENT & MATERIALS	TOTAL
TOTALS					
CONTROL LEDGER TOTALS					

Suggested Form for Analysis of Expense Items in Control Ledger

together in such a way that they should bear the full cost of a model that is made, while jobs C, D and E are not benefited by the model. In that case the cost of this item is thrown into "supplementary indirect equipment and materials account No. 1." Similarly, other supplementary accounts are opened as required. At the time of distributing costs these accounts are analyzed and the expenses allotted in proportion to the benefits accruing to each project in the group. The special circumstances of each case will determine an equitable apportionment.

If vacations are granted with pay it may happen that a client whose work is being done during the vacation season will be required to bear a greater proportion of this indirect labor expense than would a client whose work is done during the winter months. When this condition becomes important the cost of all vacation and holiday time for the year should be computed and set apart in a separate account, and one-twelfth of this total distributed each month as an item of the total indirect labor expenses.

Another method is to compute the number of working days in the year, or better still the number of working hours, and compare that total with the number of hours of holiday time which will be paid for. This will include the two weeks' annual vacation and all legal holidays. The ratio between the holiday time and the total holiday and working time, expressed in per cent, is then used to compute the indirect labor cost for this item by taking that per cent of the direct labor cost and applying it to each project. The funds thus derived monthly must be set aside and used for vacation pay, and thereafter no holiday time should be distributed directly for the period during which it occurs.

If sickness time is paid, it is best to distribute it during the current period as it is a very variable item. Long established offices may have records of sickness time which will be adequate guides for computing an allowance for such absence in the manner described for holidays, thus making all projects bear these labor expenses equally over a whole year. Some offices do not consider sickness time as a proper charge against any client, on the ground that it is a form of bonus to the draftsman in order to retain his good will. Nevertheless, the client must ultimately pay, either as overhead or in a higher fee charge, so it is better not to disguise this payment. The question is really whether any sickness or holiday time should be paid at all, and that is a matter for the architect to settle as a policy. The client, in retaining the architect, obviously agrees to his policies of management.

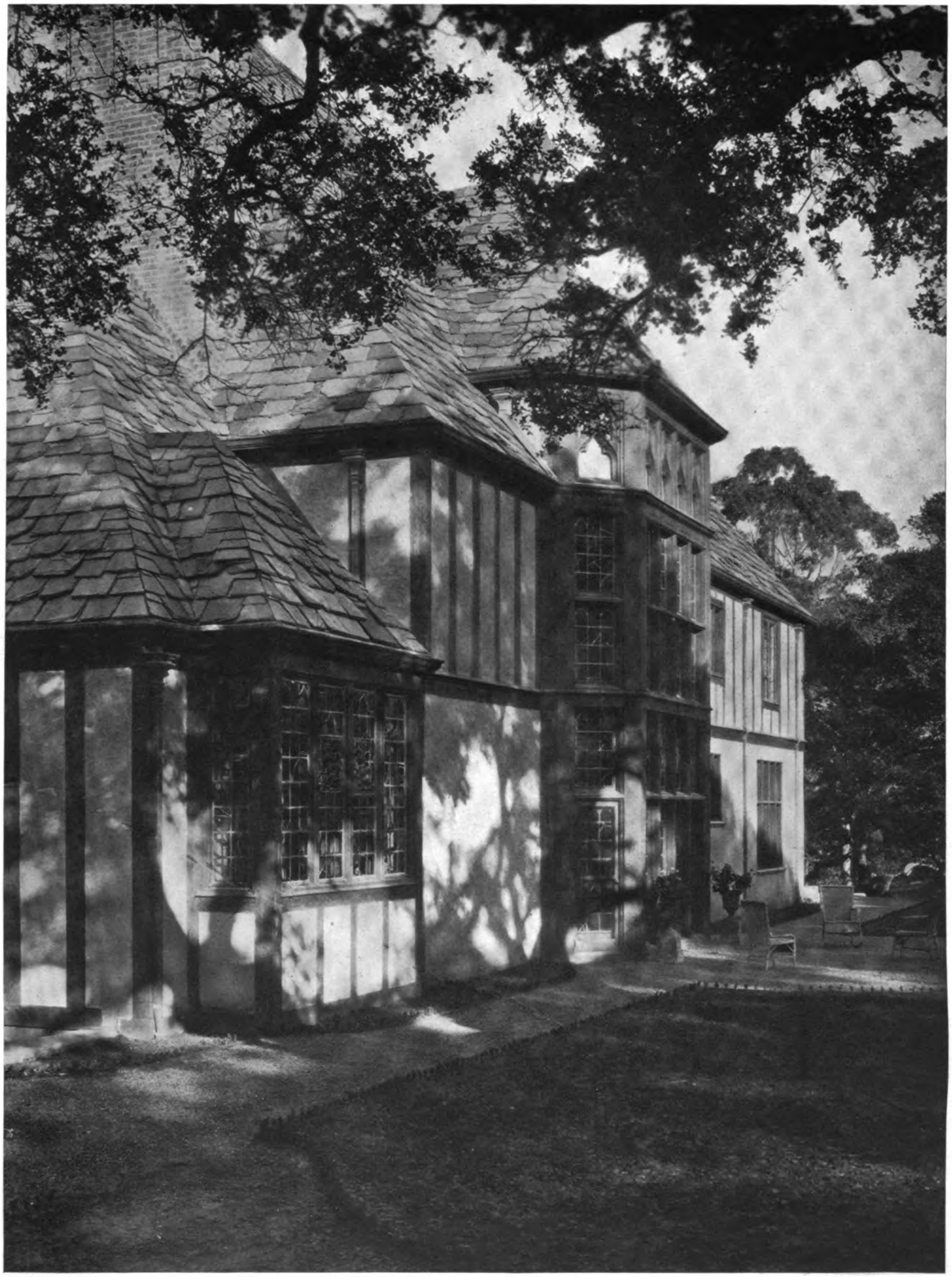
The method of computing bills described up to this point applies directly to all projects which are handled under any form of cost-plus-fee agreement. The costs are derived and clearly set forth, and the fee is added in accordance with prearranged terms. When professional work is taken for a lump-sum fee, including office costs, or when the professional fee is determined by the cost of construction, these computations merely become means of finding costs. Inasmuch as the ultimate profit depends on the difference between the fee received and the actual complete cost of the design, a cost-finding method of this kind is essential to proper management. Under the latter types of contract the methods of billing are defined in the agreement.

The presentation of bills based upon carefully analyzed costs can have no effect in the long run other than the establishment of a reputation for business ability and fairness. The architect should be able to open his books to his client at any time and show him a detailed analysis of the bills he has rendered. This can be done safely only when the computations are based on recorded facts. Systems which do not balance periodically, or which have no check, are subject to adjustments and vague charges which cannot be explained satisfactorily to a keen business man. Analysis of design costs as provided for in this method of keeping records will quickly show the architect whether his management is economical or otherwise. In these days of sharp competition it is highly desirable to cut down to a minimum the various "overhead" costs. Monthly comparisons between the direct labor and the total indirect expenses charged to all jobs will provide a ready guide as to the trend of the office in this respect.

While it may be unethical to cut professional fee charges in order to eliminate competition, it can never be said that it is improper to reduce waste in order to meet competition. An office which is conducted in strict accordance with the best interests of its clients will be able to obtain work because the clients will feel that they are not wasting money on slipshod management. On cost-plus contracts, such an office clearly can undersell its unprogressive competitors even though taking the work on their own terms. On lump-sum or percentage contracts the fee charge may be lower than most competitors' and yet the profit be the same. A reputation for economy and good management should be earnestly sought and jealously guarded.

This system of analyzing costs has been used for some time in the office with which the writer is associated. The installation of the system proved to be simple, for it was found that standard accounting forms could be used with only slight changes. The classification of accounts previously in use was modified so that the four major groups of expenses were brought together under distinguishing index numbers. A control of each group was thus established against which the ultimate distribution of expenses to clients could be accurately checked.

Perhaps the greatest value derived from this sort of analysis of expenditures is due to the fact that it accurately allocates costs to projects and departments. It has proved an unexpected aid in efficiently administering the office. It has brought to light many possible economies, has helped to eliminate waste, and has been helpful in maintaining a low and relatively uniform ratio.

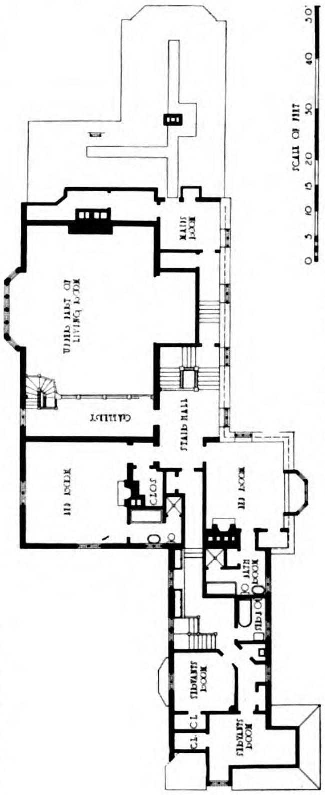


DETAIL OF GARDEN FRONT

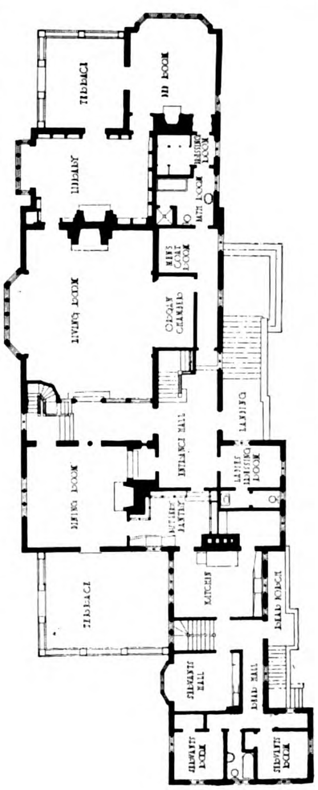
HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

GENERAL VIEW OF ENTRANCE FRONT



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

DETAIL OF LIVING ROOM BAY

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

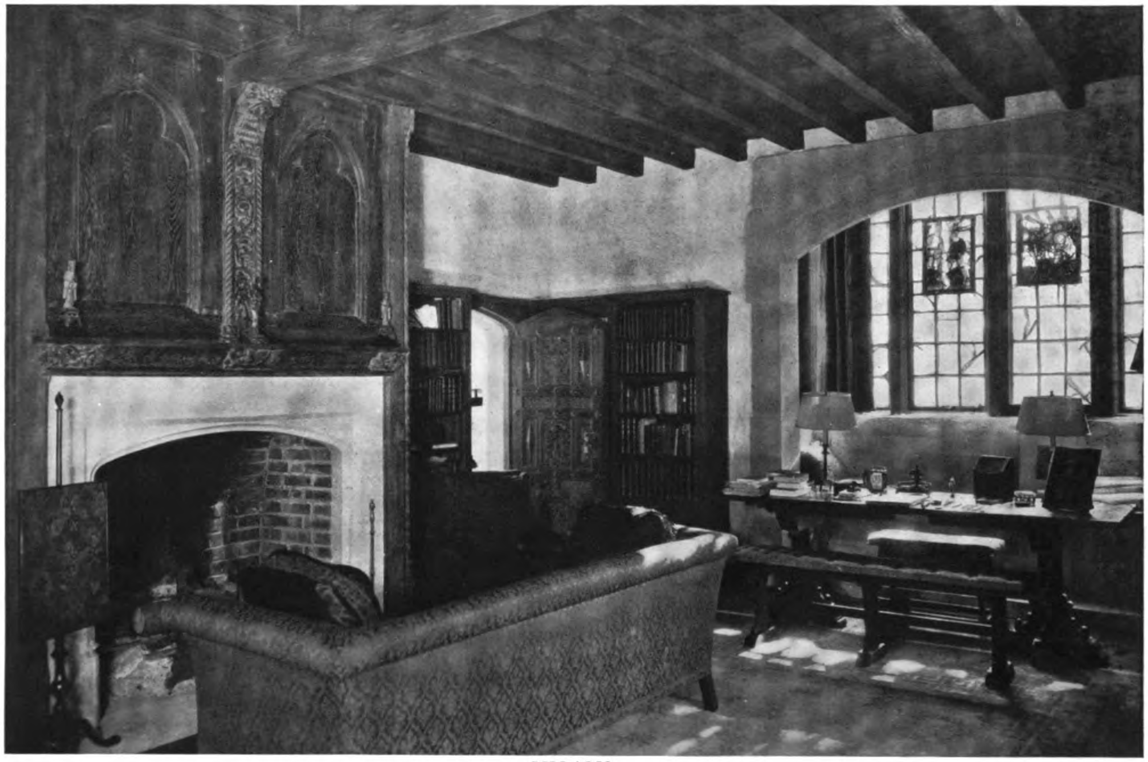
BAKEWELL & BROWN, ARCHITECTS

LIVING ROOM, LOOKING TOWARD GALLERY

DETAIL OF STAIR ENCLOSURE

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

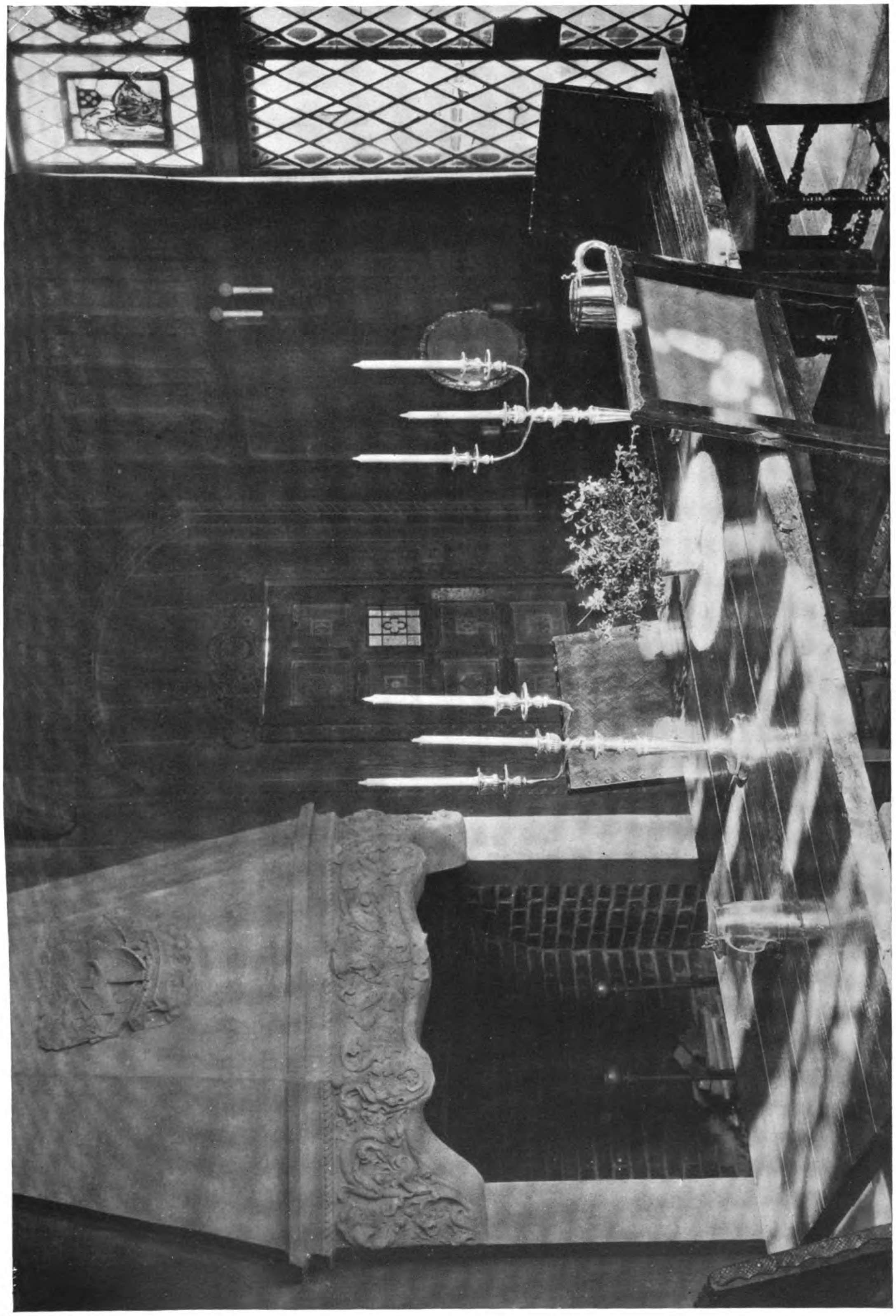


LIBRARY

FIREPLACE END OF LIVING ROOM

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

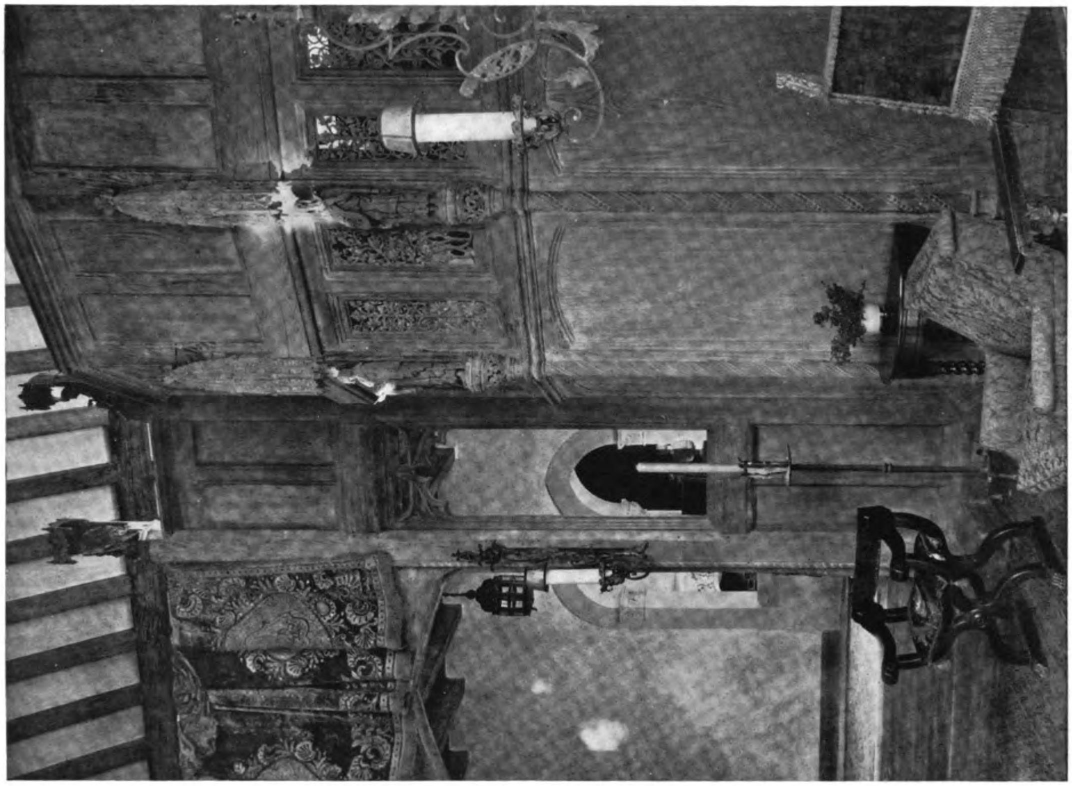
BAKEWELL & BROWN, ARCHITECTS



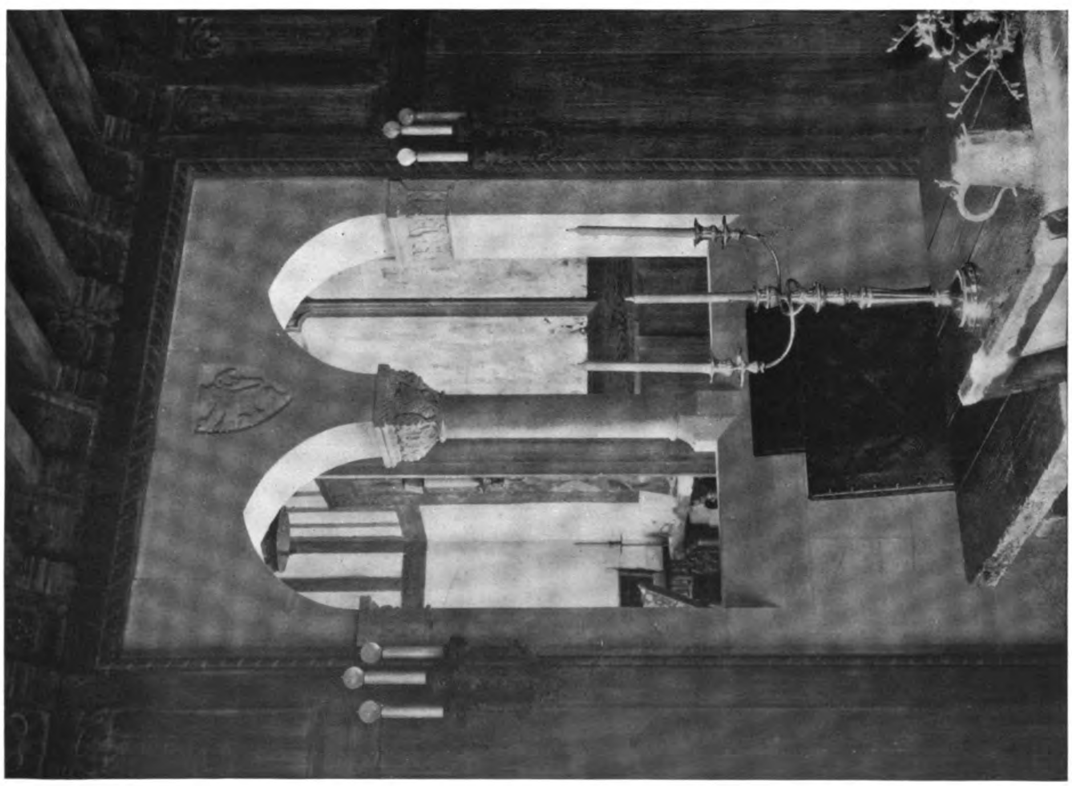
DINING ROOM

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS



DETAIL OF GALLERY



DETAIL IN DINING ROOM

HOUSE OF WM. CLARKSON VAN ANTWERP, ESQ., BURLINGAME, CALIF.

BAKEWELL & BROWN, ARCHITECTS

GRANADA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT

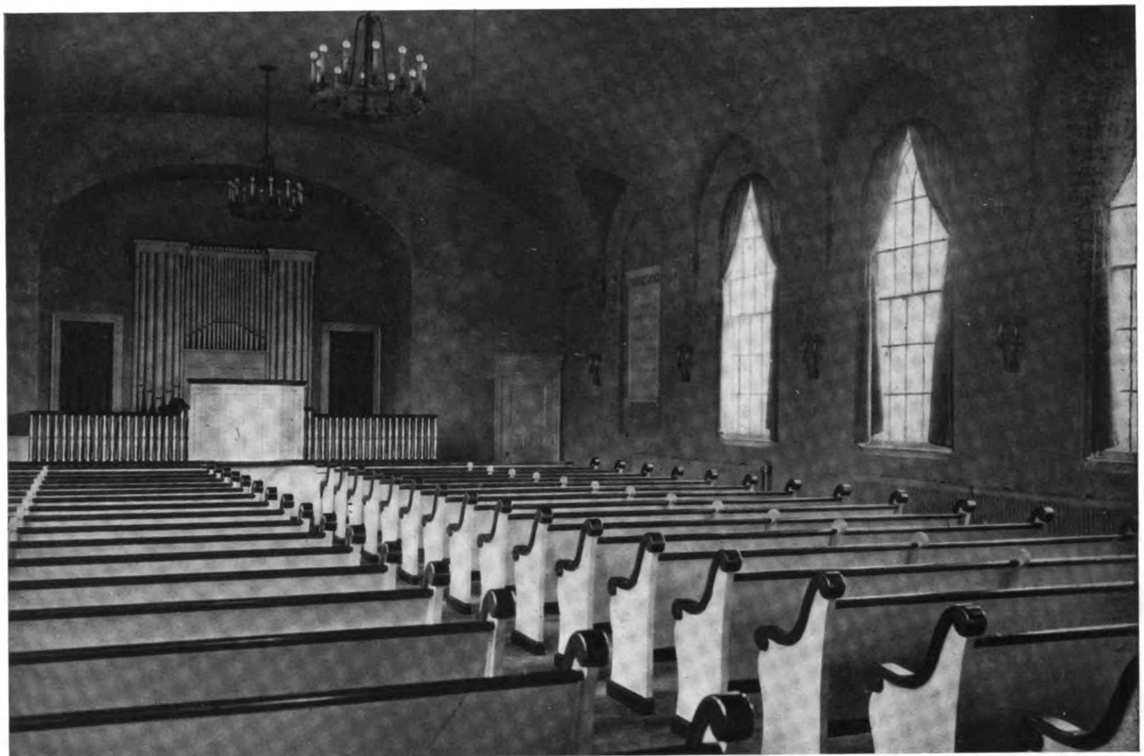
AUDITORIUM

CALIFORNIA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN.

ORR & del GRELLA, ARCHITECTS; LORENZO HAMILTON, ASSOCIATED



VIEW OF AUDITORIUM

DETAIL OF ENTRANCE LOGGIA

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN.

ORR & del GRELLA, ARCHITECTS; LORENZO HAMILTON, ASSOCIATED

Two San Francisco Motion Picture Theaters

ALFRED HENRY JACOBS, ARCHITECT

THE growing use of Spanish motifs in architecture and decoration, identified as they are with the early history of the settlement of the region, finds constant expression in California. The architectural types involved, in certain of their aspects, adapt well for large and semi-public buildings which are intended for purposes which demand a certain effect of splendor. The Spanish renaissance style possesses a florid richness which renders it particularly suited for such use; the Spanish Gothic style is not often employed excepting for churches or other ecclesiastical or collegiate structures, though like the Spanish renaissance type it abounds in advantages when there is necessity for using a style which lends itself readily to work large in size as well as in scale and for which an appearance of magnificence is considered desirable. In these styles, therefore, have been planned two recent motion picture theaters in San Francisco, the Granada Theater, planned in a modified form of the Spanish renaissance, and the California Theater in a modified Gothic style which has been given a

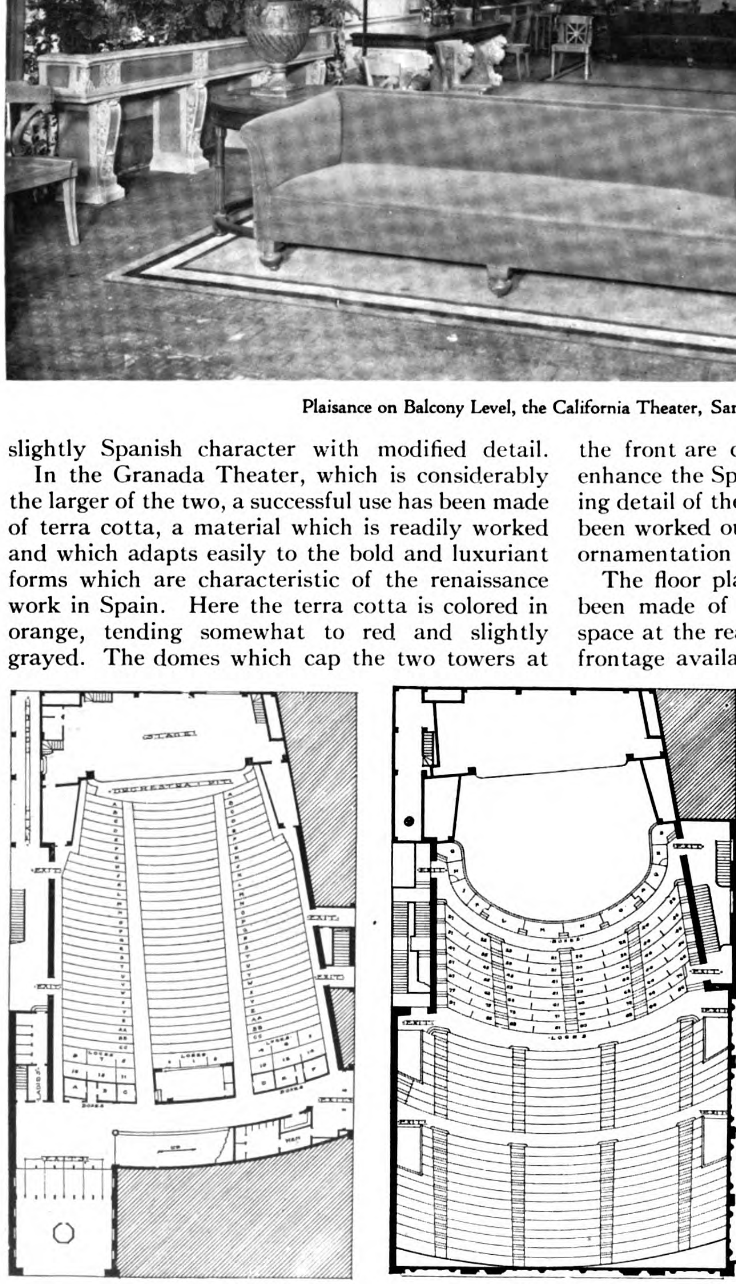
The California Theater, San Francisco
Alfred Henry Jacobs, Architect

Plaisance on Balcony Level, the California Theater, San Francisco

slightly Spanish character with modified detail.

In the Granada Theater, which is considerably the larger of the two, a successful use has been made of terra cotta, a material which is readily worked and which adapts easily to the bold and luxuriant forms which are characteristic of the renaissance work in Spain. Here the terra cotta is colored in orange, tending somewhat to red and slightly grayed. The domes which cap the two towers at the front are covered with vari-colored tile which enhance the Spanish character, and the most striking detail of the facade is a great window which has been worked out in metal of a brilliant green with ornamentation of gold leaf.

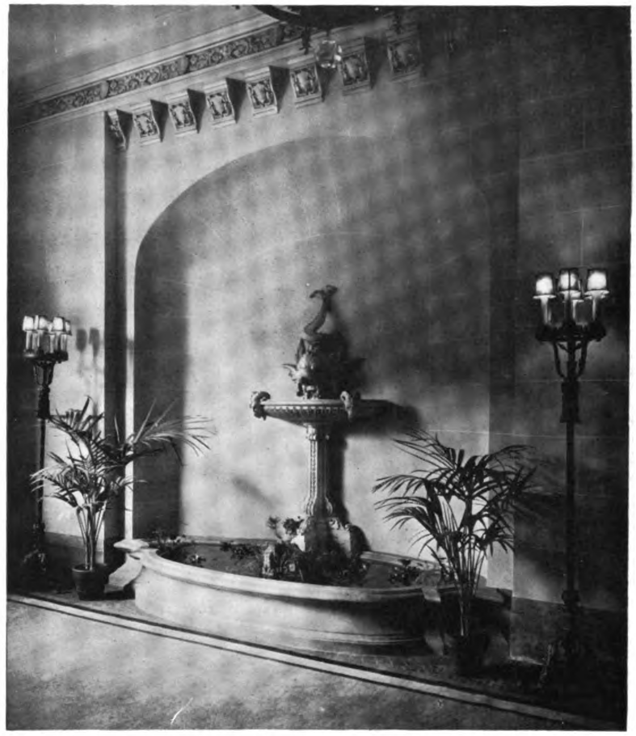
The floor plans show the disposition which has been made of the theater proper, occupying the space at the rear of the plot and leaving the street frontage available for the main entrance with its vestibule and foyer and for shops which face the different streets upon which the property fronts. The theater itself is planned in the form which experience has proved to be most suitable for houses designed for the showing of motion pictures—an auditorium somewhat deep for its width, since motion pictures should be viewed as nearly as possible from the front rather than from the side. The absence of boxes at either side of the proscenium arch is in accordance with present custom in motion picture theaters, and indeed in theaters of any sort, and beyond the orchestra space, in which is placed the console for the pipe organ, is set the shallow stage which is all that is required in a theater of this kind; the shallowness of the stage has, in fact, made possible the unusual



Auditorium Floor Plan Balcony Floor Plan

The California Theater, San Francisco

depth of the auditorium. Since the theater has been placed at the rear of the building plot, approaches of considerable length are required from the main entrance, but the auditorium can be quickly emptied after a performance by means of the ramped passages which are entered from several doors at the sides of the auditorium and which lead to side streets. This arrangement of ramps enables the audience from either the parquet floor (which is considerably below the sidewalk level on both frontages) or from the balcony (which is only slightly above the sidewalk level on both frontages) to reach the side streets. The seating capacity of the auditorium is approximately 3,500.



Fountain, End of Plaisance, the California Theater

The Granada Theater has been given a thoroughly complete electric lighting equipment which includes the largest installation of dimmers in the world. The main switchboard is operated by means of a special system with contactor rooms in the basement; the equipment provides four circuits at each outlet, affording the use of red, blue, amber and white lights, all on dimmers for use in the theater proper as well as on the stage. An elaborate system of flood lighting has been installed and supplies light from the ceiling, the side walls and from the front of the balcony. Ventilation is supplied from the roof levels, from which the fresh air is drawn, washed, heated or cooled, and then delivered by means of a plenum system to the parquet as well as to the balcony floor. Thermostat control is had, and deviating from the usual procedure, the parquet and balcony have wholly separate systems of ventilation, the theory being that it may be—and in fact it is—desirable at times to ventilate one floor and not the other, since in this theater smoking is

Plaisance on Balcony Level, the Granada Theater, San Francisco

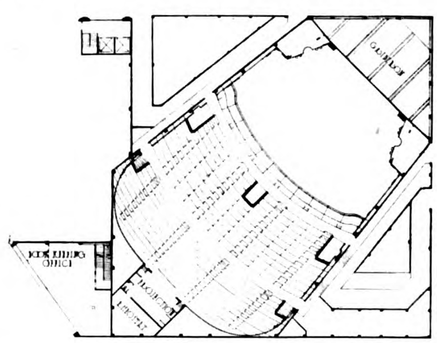
Vestibule of the Granada Theater

permitted in the balcony but not upon the lower floor, thus requiring separate systems.

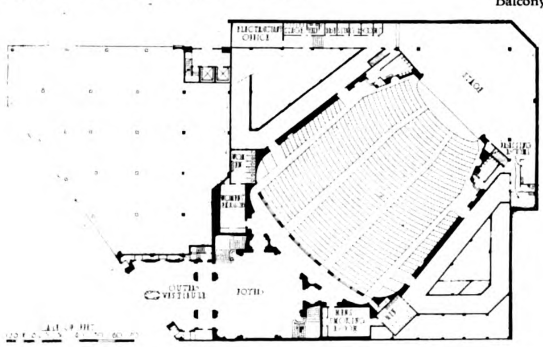
In the case of the California Theater the building plot was considerably smaller; shops occupy the street frontage of the ground floor, and the entrance foyer opens directly into the auditorium instead of being approached by the long corridors or passages which the planning of the Granada Theater on a much larger plot necessitated. The space at the front of the building upon the second and third floors, overlooking the street, is taken up with smoking rooms and women's rest rooms, the area above the third floor being occupied by the rear rows of seats in the steeply sloping balcony, which are thus brought directly against the front facade, which instead of being designed with windows has the exterior of the upper floors arranged in large panels. The entire facades of the two street fronts are of mat glazed terra cotta of buff and orange, in the design of which, as already said, the style is a modified Gothic with considerable use of Spanish detail. Additional color is given the exterior of the building by painting the window sashes emerald green.

The thoroughly complete equipment which was installed in the Granada Theater has been duplicated, in a large measure, for the California Theater, which is provided with much the same electrical stage mechanism and the same system of ventilation. The auditorium of the California Theater has also been given the long and somewhat narrow form, and as in the Granada the tiers of boxes which were once placed at either side of the proscenium arch have been left out. The seating capacity is about 2,400.

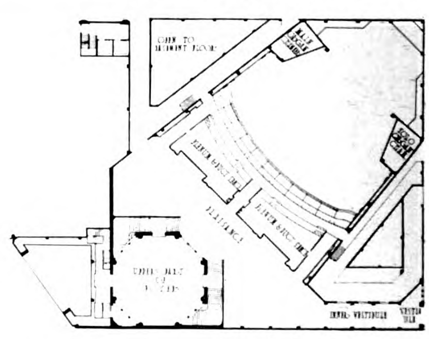
In both of these San Francisco motion picture theaters the rich and highly ornate character indicated by the exteriors has been preserved within. The treatment of a theater seems to demand a gorgeousness which belongs to the world of stageland, to present the appearance of gaiety and festivity which should be present in a theater perhaps more than in any other place of public entertainment. This richness of decoration is especially emphasized in the interiors of the Granada Theater and is indicated in the illustrations included here, while in the long approaches which lead from the main street entrance to the auditorium proper additional opportunity has been given to impart that appearance of luxury which the purpose for which the building is used renders desirable. Full



Balcony Floor Plan

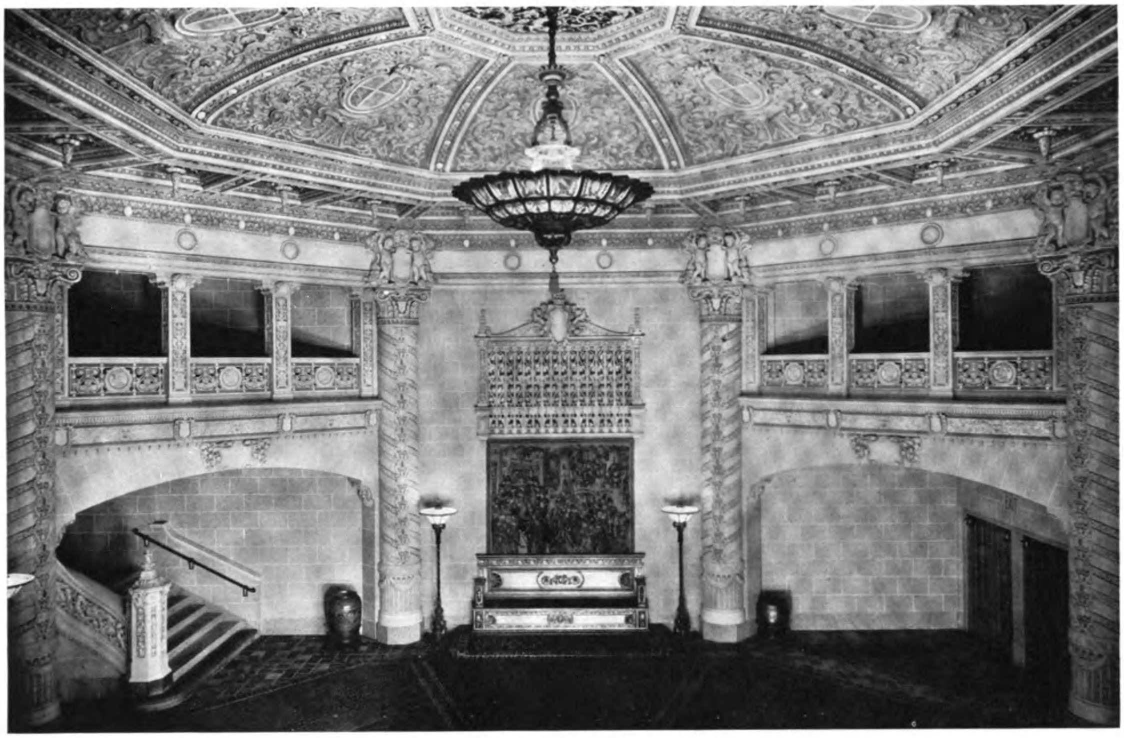


Auditorium Floor Plan

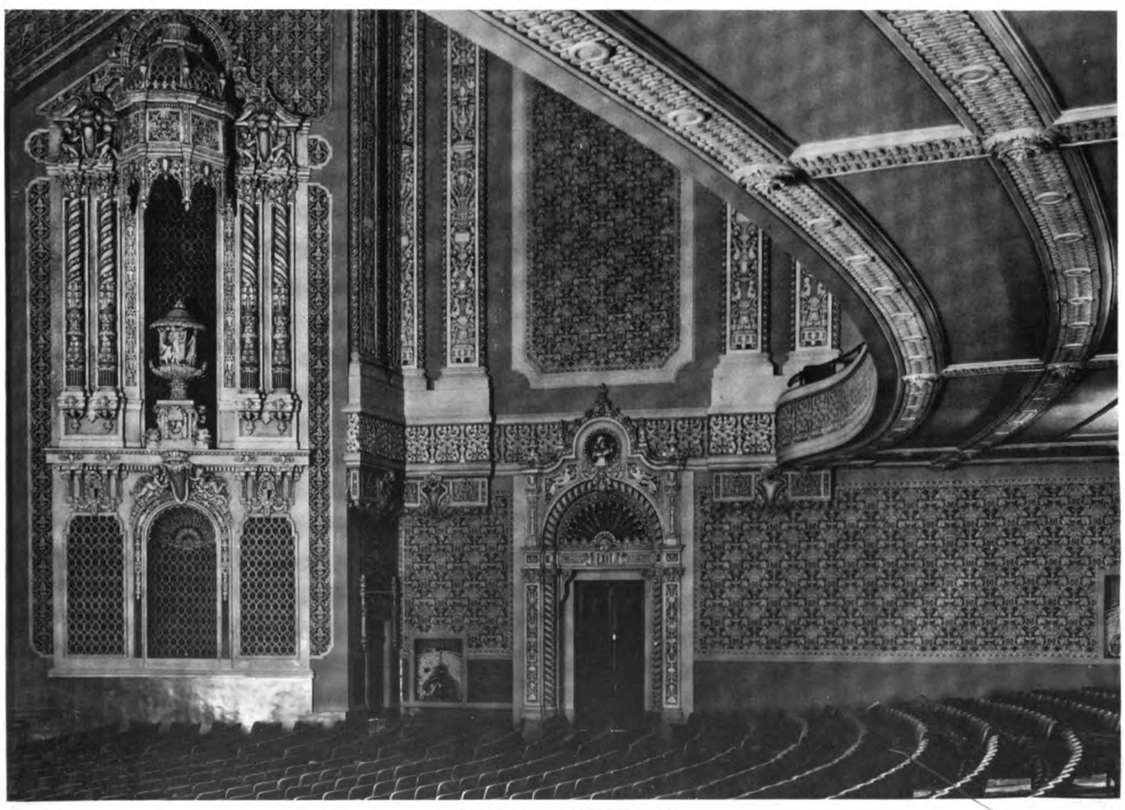


Mezzanine Floor Plan

The Granada Theater, San Francisco



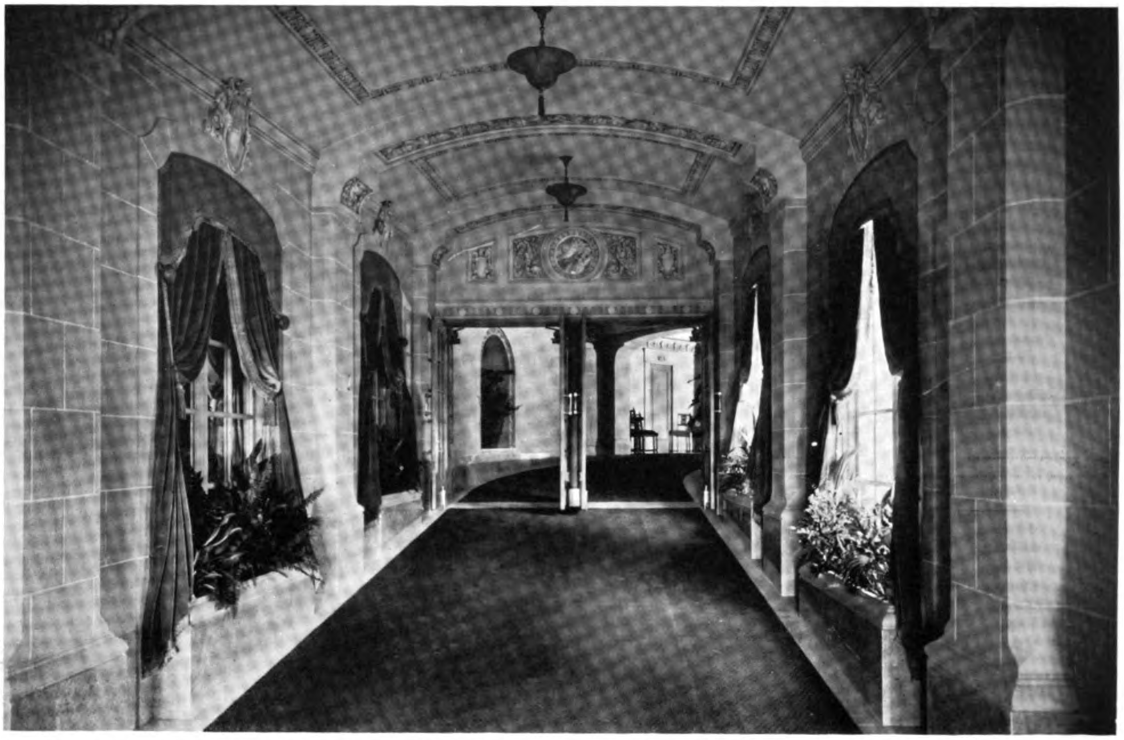
VIEW OF FOYER FROM ENTRANCE



DETAIL OF AUDITORIUM

THE GRANADA THEATER, SAN FRANCISCO

ALFRED HENRY JACOBS, ARCHITECT



Ramp from Side Vestibule Leading to Plaisance, the Granada Theater

use has been made of the bold and striking motifs in which the luxuriant Spanish renaissance type abounds. The lavish use of relief upon columns, pilasters and the parapets of the balconies as well as for ceilings involves much use of color and gold, the decoration being particularly ornate about the proscenium arch with which there have been combined the grilles through which the sound of the pipe organ enters the auditorium.

With the California Theater the Gothic details of the exterior indicate the decoration which may be expected within, for use has been made of Gothic motifs wherever possible, much ingenuity being shown in the adaptation of ornament to different purposes. Particularly successful is the use of Gothic motifs for the proscenium arch and its surroundings, especially for the grilles above the arch.

Detail of Turret, the Granada Theater

In any building of a public or semi-public nature, the patrons of which are largely women, considerable attention must be given to such adjuncts as rest rooms and dressing rooms, and their treatment offers many opportunities for adding to the surroundings that touch of domesticity which their uses render necessary. The departments for the use of men patrons, such as the lounging and smoking rooms, offer added opportunities for appropriate decoration and furnishing which in these theaters have been made the most of. The walls of plain gray or tan which are often used in these lounging and retiring rooms create an excellent setting for figure and color in draperies and floor coverings, such rooms being generally so furnished and decorated that they are of smaller architectural importance than the theater.

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

The Culinary Department and What It Means to Architects

By N. W. ALDRICH

WHILE it is to be admitted by everyone that the culinary department of a hotel requires more study than any other detail, it is in a great many cases left to the last, simply following an old time custom. Plans are carefully drawn showing all the arrangements of rooms and hotel accessories, and frequently an indeterminate space is left somewhere in the basement and marked "kitchen." There are many instances where the kitchen layout, and in speaking of the kitchen we mean the whole culinary department with its service rooms and mechanical plants, has been the source of much embarrassment to the architects and engineers because of insufficient provision for their important functions.

In the old days, the days of the "tavern" and many of the famous old hotels (some of which are still running), there were probably several reasons why this department was left to be studied out after the architect had put the finishing touches on the other departments, making everything so beautiful and pleasing to the tourist that he would not fail to tell his friends of the one place which was ideal and according to his liking,—the last word in hotels. Surely enough there would be ample space for the kitchen, bake shop, serving rooms, storerooms, laundry, etc., and in many cases, more room than necessary, because the building covered a large area, and the basement, which appeared to be the logical place for these departments, would surely take care of itself when the time came to install the various kinds of equipment. The overhead of those days was small compared with that of today. Competent servants were trained to care for the various departments and took pride in producing the best results possible. The reputation of many a hotel has been built up on its standard of food and service.

From these departments, which were scattered in all directions from the real base, their products had to be continually transferred either to the kitchen, serving or dining room. Naturally it required many hands for this work alone, and now the old timer can plainly see how much he could have saved, even in the days when labor was cheap and plentiful, if his culinary department had been more carefully planned and condensed. This has already been proved by those who have remodeled or built anew. By condensing these departments as much as possible, and at the same time planning the various branches in such a manner that they may be operated conveniently, the larger staff of unskilled servants required for transferring food or dishes from place to place is eliminated. The person in charge of this department is better able to give each of its branches his personal attention without traveling through miles of corridors and stairways each day. Also, by having more time to be devoted to other work, he may eliminate the need of an assistant or more competent or higher-salaried persons in charge of the various branches, which ordinarily he would seldom visit unless called upon by the manager to adjust some complaint.

The Value ot Good Planning

Space conservation is not the only conside ation in the modern kitchen layout. True, the reduced payroll due to more intelligent planning is an important factor, but the morale of the employes must be considered and provision must be made for their comfort and convenience. If the employes are not given proper dining rooms and are not allowed proper food they are not likely to stay and work. In the old days the "help" were served anything which might be left over and were told to eat that or nothing. Imagine trying to deal with present-day employes on such a basis! Dining rooms for both men and women employes, locker rooms and proper toilet facilities must be provided, and these take space. Perfection is almost impossible to attain in a culinary department layout; the essentials, however, should be so arranged as to permit easy communication, minimum interference and minimum encroachment on seating space for guests.

It is not wise to spoil the chances for proper service by crowding as many tables as possible into a dining room, which in most cases the owners demand. Every chair in the dining room represents an overhead, and providing the service is slow, this chair will not net as much as the chair where proper service is given. The person who waits 20 minutes longer than he should for his order is not only wasting his own time as well as growing dissatisfied with the service, but at the same time is occupying valuable space. The waiter who steps from the dining room to the kitchen and returns with one's order in

a minute or two, will not wear the same expression as the waiter who is gone 10 or 15 minutes and has spent half of his time traveling through corridors and climbing stairs, and the waiter with the grouch, together with the customer who is entitled to a grouch, will often make more trouble than a Spanish omelet made with musty eggs. Had hotel proprietors given more thought to this problem years ago, they would not have spent so many unpleasant mornings sitting in the lobby watching their guests (especially commercial men) toss their keys to the clerk and rush across the street to a restaurant or quick lunch, where they would eat their grapefruit, eggs, toast and coffee, and be on their way in the same time it would take for the hotel waiter to give his order to the cook, or while the captain was chasing back and forth to the kitchen, looking for the waiter who belonged on that station.

Installing Cafeterias

During the past few years, and especially the last three, nearly all hotels have adopted the quick lunch or cafeteria plan, and in this way have been able to get not only the price of three square meals as well as lodging from the traveler, but have received as well the patronage of hundreds of others who appreciate small portions of properly cooked food at moderate prices. In many cases the café or grill room has been remodeled for such a purpose, and as a rule it works out to perfection, owing to the fact that it was originally connected with the kitchen; in case it was not, it means either a long distance to transfer food, or so much extra equipment as well as skilled service that it represents practically the expense of another department. Therefore the cafeteria or lunch room, as well as the dining room, should be when possible so located that the individual who is in charge of the kitchen and its branches would be able to oversee the service of this department as well.

It is not always the largest kitchen that gives the best service, and the same rule that applies to the culinary department as a whole applies to this section more than to any other. In this branch where there are meat cooks, vegetable cooks, salad men, storeroom girls, dishwashers, waiters or waitresses, and bus boys, all working together, care should be taken that each and every person can perform his or her duty without interference.

Air locks between dining room and kitchen are of great importance in preventing the spread of noise and odors from the kitchen, and although they do not add beauty, and in most cases would ruin the dining room, there is seldom a case where they cannot be included as a part of the kitchen without doing damage or interfering with the arrangement of the equipment. Narrow and shallow air locks are not only useless, so far as noise and odors are concerned, but will keep the steward busy buying crockery and glassware; they will also keep a boy busy with the mop and broom. Air locks should be deep enough to allow the waiter to pass without both doors being open at the same time. This will enable him to walk more naturally, keep his balance easily and open the second door without difficulty. As it is natural for the average waiter to keep to the right, try to keep him moving to the right by having both doors open by being hinged on the right and close against post in center.

To the right of the air lock, after entering the kitchen, would be the logical place for him to deposit used dishes, glass, silver, etc., and providing space is available for washing glass and silver, this section of the kitchen should be equipped for that purpose. The opposite side of the air lock, and where the waiter passes on his return to the dining room, should be equipped as serving pantry, and in most cases this branch can be so arranged that the space taken up by the air locks would never be missed.

The arrangement of the other fixtures required in a kitchen will of course depend upon the space of the floor as well as upon the amount of business expected, but no matter how large or small the kitchen may be, it is practical to keep the ranges, broilers, and any cooking apparatus either in the back of a small kitchen or the center of a large kitchen, whereby the odors and heat will be drawn *away* from the dining room side by means of a natural draught or an exhaust fan. This will cause the air in the dining room to take the proper course, through doors in the kitchen, thence to hood, instead of being reversed by too much dining room ventilation, which often happens, especially in cold weather.

It is extremely important in arranging a kitchen layout, and this applies also to the serving rooms, that the fixtures be arranged so that the waiters have a definite progression from "soup to nuts." The "path," as it is called, leads the waiter through the department where he obtains the various articles he is to serve without retracing his steps or crossing the line of other waiters. As each article is "picked up" he moves on until he leaves to enter the dining room. As he removes the used dishes from one course, he must have a place convenient as he enters the service portion to leave them. Then as he progresses he "picks up" the other dishes without interfering with waiters serving the same or other courses. To arrange the "path" properly is the big problem in hotel or restaurant kitchen planning. One can readily select the type of fixtures and easily determine the relative demands for fixtures, but many a good kitchen has been spoiled as to efficiency by improper planning.

It would be highly desirable for the architect or engineer in making plans for a building where kitchen equipment is required, to consult with the chef and also with an equipment expert before arranging construction details in such a way as to impede the service when the kitchen is in use. This is one phase of building construction which is so seldom encountered in the ordinary practice of the average architect that only by consultation and co-operation can the best results be obtained.

Electrical Wiring Layouts for Schools

(CONTINUED)

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE arrangement of wiring in no department of a school building is more important than that of the assembly hall, particularly since such a room is often used for purposes which do not belong strictly to the school's work.

The Assembly Hall Stage. In the larger assembly halls, where large stages are provided, certain lighting effects are at times required, and standard dimmer banks with multi-colored lighting are used. Where this is done the regular dead front type of theater switchboard is installed, with interlocking switches and interlocking dimmer equipment. In the smaller halls, however, this is not required, nor is dimmer equipment in general use.

The best methods of lighting the stage will depend more or less on the proposed stage equipment, as well as on the stage construction. If a gridiron is provided over the stage it will be necessary to make use of standard stage border reflectors, these arranged to be raised and lowered by means of cords and pulleys. From one to four borders will be required for stage lighting, depending upon the depth of the stage and the nature of the equipment. One border reflector is located just back of the proscenium opening, the placing of the remaining borders depending on the location of the flies. The lengths of the borders for this work should approximately equal the width of the proscenium opening. Each border should be fitted with three or four circuits controlled from the stage switchboard or panel, about 12 lamps being allowed to each circuit and these spaced alternating on 10- or 12-inch centers so that a portion of the light may be used at will, or so that different colored lamps may be used if desired. In addition to this, two or three single-lamp outlets should be provided in each border and connected on one circuit, these to be used as "working lights," and controlled from the stage panel.

The outlet for each border reflector should be located on the gridiron and near the center of the stage, the wires running in conduits from the outlet to the stage panel, and from the outlet to the border by means of a flexible cable containing the proper number of wires. The cable should be of sufficient length to permit the borders being lowered within a reasonable distance from the floor of the stage for cleaning and the replacement of lamps. It is also good practice to allow at least one extra circuit in each cable for use in case of the breaking of any one of the regular circuits.

In the event of a gridiron's not being considered, but a high ceiling provided over the stage (as with the use of a drop curtain), border reflectors will be required as just described to give satisfactory illumination. When, however, the ceiling is low and the depth of the stage does not exceed 16 feet, the stage may be satisfactorily lighted by means of a single row of ceiling receptacles, these installed on the ceiling at approximately 12 inches from the rear of the proscenium arch; the outlets should be spaced 10 or 12 inches on centers and connected on three or four circuits with lamps alternating, the circuits controlled from the stage panel. The outlets may be used with some type of open opal reflector or may be used without reflectors, since the lights are concealed at the rear of the arch and cannot be seen from the hall. The light reflecting from the ceiling gives uniform illumination over the stage at a much less installation expense than would be the case if borders were used.

As a rule at least 36 receptacles should be used in this work, with two or three receptacles for use as working lights. It is also advisable to include the complete installation of these receptacles under the wiring contract. When borders are required it is advisable to specify that the borders shall be furnished complete with the full equipment of cords and pulleys.

Footlights. This equipment should be provided in all cases, regardless of the size of the assembly hall. If the stage is large and is to be used for fixed work, the standard theater footlight reflector will be required. If, however, the stage is to be used for school purposes and for lectures more than it is to be used for plays, some type of folding footlight will be better, as this gives a clear stage when the lights are not required.

A straight footlight trough permits the use of a folding footlight reflector, practically in one piece, and the reflector may be folded into place without removing the lamps or apron. If the trough is to be built on a curve the trough may be installed permanently, with a separate apron. When the lights are required the cover boards are removed, the lamps screwed into the sockets, and the apron set in place, this fitting in lugs fastened to the receptacle box; or a folding type may be used made up in a number of sections, each folding separately and connected together with flexible leads, small sections of the apron being removable and set in place between the sections when the lights are in use. The one advantage of this type is that it does not require the removal and replacement of the lamps when the reflector is used. In the locating of footlight equipment for assembly hall work it is of importance that the trough be placed at a sufficient distance from the front of the stage to permit a student to stand at times in front of the footlights; as a rule there should be a clear space of at least 24

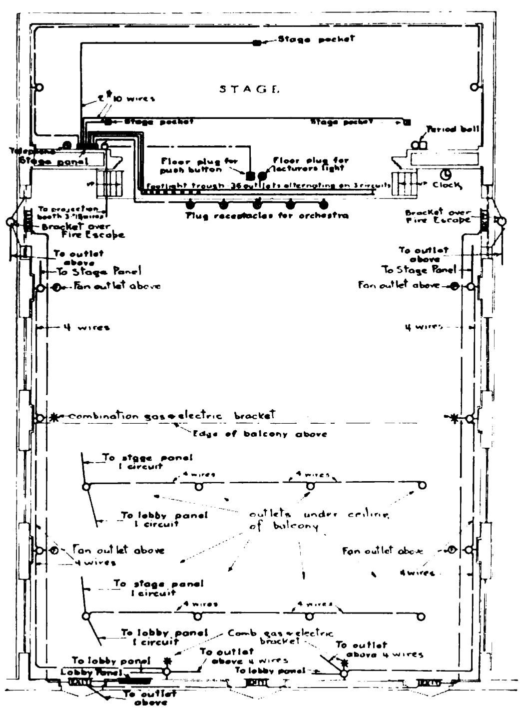
inches. The trough in readiness for the installation of the reflector should be furnished under the building contract, while the installation of the reflector, complete in all respects, should be included under the wiring contract.

Receptacles, etc. With the use of a gridiron, two or three outlets should be placed above the grid for use with drop cords, these outlets controlled from the stage panel and by means of a switch at the foot of the stair leading to the grid. With the use of galleries outlets should also be located on each gallery and connected with the same circuit. With a shallow stage it is well to locate three receptacles in the baseboard of the rear wall, thus permitting the use of portable brackets, table lamps, or other portable equipment during a play. Two or possibly three standard stage pockets should be located in the floor of the stage, one at each side and one in the center, these to be of 30-ampere capacity and connecting to the stage switchboard or panel with two No. 10 wires from each pocket. Provision should be made for a speaker's lamp, by means of a 10-ampere, moisture-proof floor receptacle set in the floor of the stage and at the rear of the footlight trough. This receptacle is fitted with a flush brass plate which is screwed into the cover when the lamp is not in use.

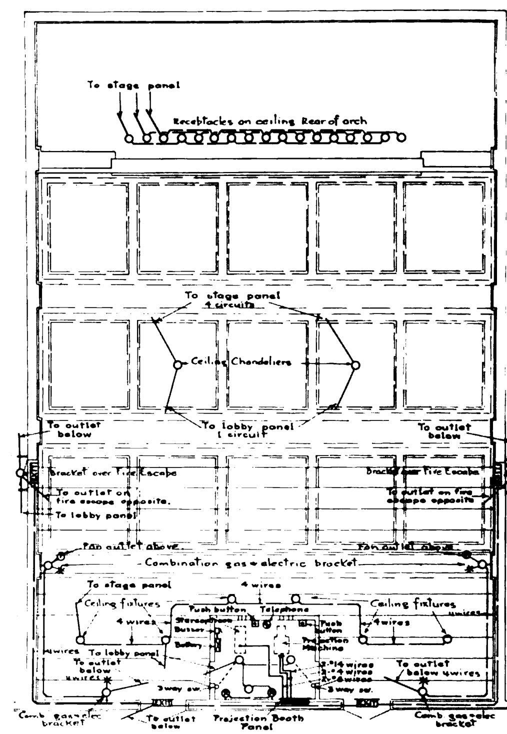
For the use of an orchestra provide five or six flush 10-ampere receptacles in the baseboard, at the front of the stage. These together with the outlet for the speaker's lamp may be connected on one circuit and controlled from the stage panel.

The Stage Panel or Switchboard. In the larger halls, where a standard type of stage switchboard is used with dimming equipment, provision is always made for this board at either the right or the left hand side of the stage. The board is set at a point 5 feet from the wall, the dimming equipment mounted over the switchboard so that the dimmer handles are convenient to the man operating the switches. The master fuses are located on the rear of the switchboard and in convenient locations for replacement; all circuit fuses, however, are located in what is termed a "magazine cabinet," which is made up of steel and located on the wall at the rear of the switchboard. Ordinary porcelain fuse blocks or cutouts of the plug type may be used in this cabinet, there being several compartments and a number of narrow doors permitting access to the fuses and cutouts. Connection between the magazine and the switchboard is made with wires in conduits.

For the average assembly hall, however, where dimmers are not to be used, this type of stage panel is not in general use, as a more simple and less expensive type of panel will give satisfactory service. This panel may be of the dead front type, with push-button switches, snap switches, or toggle switches, of the type used on the panels of the general lighting service. This panel should be set in a steel cabinet and flush with the wall at some convenient point; it may be made in two sections, one



First Floor Plan



Balcony and Ceiling Plan

Typical Wiring Plan for Small Assembly Hall

section containing all switches controlling the circuits of the main lighting of the assembly hall. This includes all ceiling illumination as well as ceiling lights under balconies and at balcony fronts, etc. The second compartment should contain the switches controlling all stage lighting, circuits controlling wall fans (if used), footlights, orchestra receptacles, as well as any bracket lights that may be controlled from the stage. The second compartment should also contain the master switch controlling the stage panel, the three 30-ampere switches controlling the stage pockets, and a remote control switch which will master the buss bars of the first compartment.

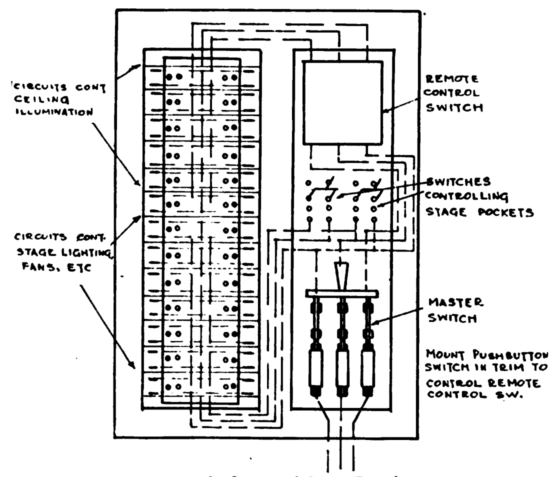
The remote control switch referred to (usually of 60- or 100-ampere capacity) masters the buss bars controlling the general illumination of the hall, and permits all of this illumination to be thrown on or off at will, the volume of light to be thrown on or off by the switch being determined by the number of circuit switches that are "set" in the first compartment of the panel. One push-button operating switch (by which the remote control switch is operated) is located on the stage panel, the second operating switch being mounted in the motion picture booth, thus permitting the control of the general illumination of the hall either from the booth or from the stage panel. Thus, with the use of motion pictures, the hall may be darkened by the operator when the picture is ready, and may be lighted when the picture is finished, or immediately in case of accident or disturbance.

Dressing Rooms. These utilities being provided adjacent to the stage, it is sometimes a good plan to locate the stage panel in one of the dressing rooms. When this is done it is well to connect the circuit feeding the lighting outlets of the dressing rooms with one of the corridor panels so that this light may be controlled on a feeder separate from the feeder of the stage switchboard. This insures light in the event of the fuses of the stage panel opening, and permits the ready replacement of these fuses without delay.

Wall Fans. Such accessories when used should be controlled by means of circuits from the stage panel. They are not a necessity in a properly ventilated hall, but they serve a purpose in keeping the air moving and should be considered. The outlets for the fans should be spaced conveniently and should be 7 feet, 6 inches above the floor; from six to ten outlets should be connected on a circuit. Fans over a balcony should be on a separate circuit from the fans on the lower level, permitting of separate control of the fans on the two levels. Each fan outlet should consist of a flush 10-ampere receptacle, permitting the fan cord to be connected to the receptacle through a plug.

Wall Brackets. These brackets should be considered both under and over a balcony and along the walls; they may be connected to control from the lobby panel and from the emergency circuit, the brackets acting as usher lights and being useful when low illumination is required during a performance. At times two- and three-light brackets are considered, each outlet being double-circuited, one circuit and half of the illumination controlled from the stage, the other half controlled from the lobby panel.

Exit Lighting. A complete equipment of exit signs should be installed throughout the hall, these being located over each of the exits, both in the hall and in the corridors, so that there may be no misunderstanding as to the proper exits. The signs are usually set flush and are worked into the details of the mouldings. All signs should be fitted with two



Detail of Typical Stage Panel

receptacles for 25-watt lamps, the lamps being connected in multiple so that there will still be light if one of the lamps should burn out. In some instances the two lamps are connected on separate circuits, thus permitting of double control of the exits. All exit signs should be controlled on circuits from the lobby panel and on a separate emergency feeder circuit. There should be an outlet provided over each of the fire escapes, these also connected to feed from the lobby panel and on the emergency feeder circuit.

Provision for Organ. Where an organ is considered in the assembly hall provision must be made under the wiring contract for the control of the blower motor and for pipe raceways to permit the installation of the wiring to the console and organ lofts.

Some room will be provided on the basement floor to provide for the installation of the organ blower. The furnishing of the blower and all equipment ready for wiring will be provided under the organ contract, together with all wiring to and between the low voltage generator, the organ, and the console. The electric contract should provide a 2½-inch empty conduit from the location of the console to each of the organ chambers or lofts, and when more than one loft is to be used, a similar empty conduit should connect the lofts, these conduits terminating at all outlets in a T. & B. bushing

and being left in readiness for the drawing in of the wires.

The electrical contract should also provide conduit and wires from the console to the blower room, with push-button at the console and a remote control motor starter in the blower room, together with all connections to and between the power service, the motor and the starter, so that the organ motor may be started and stopped from the location of the console. A pilot lamp is to be mounted at the console which will glow when the motor is in operation and be canceled when the motor is stopped. An outlet is also required for use in the console, this controlled from a local switch so that a lamp may be burned to prevent dampness.

Provision should also be made for a 600-watt heater outlet in each of the organ lofts, a single circuit being carried from each of these outlets back to and controlled from the stage panel. A pilot lamp should be located at some convenient point on the stage or at the panel so that the lamp will indicate when the heaters are in operation; a standard 10-ampere receptacle is provided in each of the lofts, permitting the ready connection of portable electric heaters.

The Motion Picture Booth. The booth should be wired for two projectors and one stereopticon lantern, also for lighting and for the operation of a ventilating fan. The lighting outlets should be controlled from circuits from the lobby panel. The projectors and the fan should be controlled from a separate switchboard or panel located in the booth.

The booth panel should be mounted in a flush steel cabinet at some convenient point, a circuit of two No. 2 wires carried from the panel to each of the projectors, the conduit being run in the floor construction and turning up, with an elbow at the location of the projector machine and terminating in a porcelain capped fitting 12 inches above the floor; 4-foot ends should be left on the wires to permit of connection with the machine. Two No. 6 wires should also be run from the panel to the location of the stereopticon outlet, this outlet consisting of a standard 50-ampere stage pocket set in the front wall of the booth and connecting with the lantern by means of a plug.

If direct current service is furnished the building it will be necessary only to reduce the voltage, through resistance coils (located in the booth), and either arc or incandescent motion picture projectors may be used. If alternating current service is furnished and arc projectors are to be used, it will be necessary to provide direct current through a motor generator set or converter for the satisfactory operation of the arc projectors. If projectors of the incandescent type are to be used they may be satisfactorily operated on either alternating or direct current, while if it is assured that arc projectors will not be operated the wire sizes just given may be reduced to No. 6 wire for each of the projectors. While the use of the incandescent projector is becoming more and more common in smaller schools and motion picture houses, the arc projector is in common use throughout the larger schools and theaters, and it is questionable whether the wire sizes should be reduced below those required for the arcs, even if the incandescent projectors are considered.

The motor generator set may be included under the electrical contract, or may be later purchased as part of the motion picture equipment. A suitable location for the set may be in the boiler room section and under the charge of the engineer, or in the service room at a point near the service switchboard. A remote control switch and starter may be used by means of which the set may be started and stopped from the booth, the usual pilot lamp being installed in the booth to indicate when the set is in operation.

In many instances, even when the use of an incandescent projector is contemplated, an empty 1½-inch conduit is installed between the booth and the service room, permitting the later installation of the set if so desired.

Not less than two No. 0 wires should be run from the service room to the booth to provide direct current to the arc projectors, and three No. 1 wires should be run from the service switchboard to the lobby panel and connected to the buss bars for the general lighting controlled from this panel, this circuit continuing from the lobby panel to the panel in the booth to provide an alternating current breakdown service for the projectors and for operation of the ventilating fan.

The booth panel should contain three 100-ampere, two-pole, double-throw fused knife switches for the control of the two projectors, and one 60-ampere, two-pole, fused knife switch for the control of the lantern; should also contain one 30-ampere, two-pole, single-throw fused knife switch for the control of the fan for the ventilation of the booth. The center poles of the double-throw switches should connect with the leads to the projectors and the lantern, the outer ends connecting to separate sets of buss bars fed from the alternating and direct current feeders respectively, thus providing two services for the panel, the ventilating fan connecting to the alternating current buss bars only.

Signals Between Booth and Stage. A return call buzzer system should be provided between the booth and the stage, this consisting of a small buzzer located on the stage with a similar buzzer in the booth. At a point on the stage near the location of the speaker's lamp, a moisture-proof floor outlet should be located, this complete with receptacle, pear push-button, plug and 10-foot bell cord. A standard wall type push-button should be located in the booth, and the outlets connected by No. 16 wires in conduit, providing a return call bell or buzzer system by which the stage and booth may signal. A 6-cell dry battery should be provided to operate the system, the battery cells located in a flush cabinet either on the stage or in the booth, as desired.

Plate Description

OFFICE AND RESIDENCE OF FREDERICK STERNER, ESQ., New York. Plates 57–61.

In this successful alteration, of which Mr. Sterner himself is the architect, there is given a striking illustration of what can be done with a city residence obsolete as to type but strong as to structure. The building which is at the southwest corner of 65th street and Lexington avenue was until recently a typical example of the New York city house built perhaps a generation ago, with walls of brick excepting that upon the avenue front, which was of brown stone, and possessing the regulation four stories and basement, the main entrance which faced upon Lexington avenue being reached by the usual high stoop.

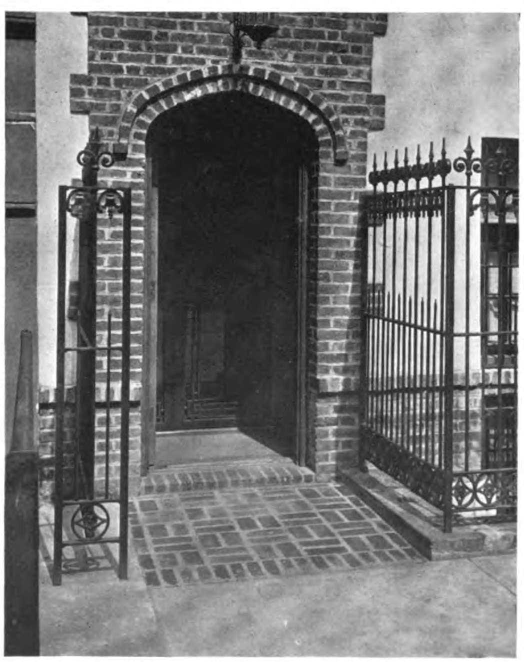
The alterations include the building of an extension at the rear of the original structure (the house as it now stands occupying the full area of the plot), the doing away with the high stoop and changing the original main doorway into a window, the arrangement of a new entrance at the basement level on the street side, and particularly the addition of what is in effect a hip roof of slate and the covering of the exterior walls with cream colored stucco of a slightly rough cast. The severity of the expanse of wall upon the street side is relieved by skillful use of parge work, relief wrought out in plaster, for certain areas.

Wherever possible use has been made of existing exterior and interior walls, the arrangement of the different floors being such as to afford a few large, ample rooms rather than a larger number of smaller rooms. The illustrations give an excellent idea of the interest of the interiors, due largely to the skill with which use has been made of much ancient paneling and carving and many excellent antiques.

HOUSE OF WM. CLARKSON VAN ANTWERP, Burlingame, Calif. Plates 62–68.

The Tudor style, in which this large house has been designed, is particularly well suited to the site which is an extensive natural park, situated on a gently sloping hillside which is partially covered with a fine growth of old oaks.

In arranging the interior use has been made of a collection of interesting and valuable antiques which have been collected by Mr. Van Antwerp. In the three main living rooms, P. W. French & Co. of New York collaborated as decorators with the architects of the house, Bakewell & Brown of San Francisco.



Entrance to Office and Residence of Frederick Sterner, Esq.

FIRST CHURCH OF CHRIST, SCIENTIST, MERIDEN, CONN. Plates 71, 72.

The extremely attractive appearance of this village church is due to the use of simple materials in a pleasing way. The structure, which recalls certain old churches or meeting houses in New England, is but one story in height, the rooms at the rear giving much the appearance of transepts, while to relieve what might easily be the somewhat squat appearance of a building of which the area is large in proportion to its height a graceful cupola is built above and slightly back of the pediment which marks the front. The structure is Georgian in character, with round-headed windows, and the architects, Orr & del Grella of New Haven, Conn., and Lorenzo Hamilton of Meriden, associated, have used selected common brick of varying shades with occasional dark headers. Joints are flush and are yellow-brown in tone, and the trim which is painted a deep ivory ties in well with the color of the walls.

A coat room is placed at each side of the entrance vestibule, and the rooms back of the pulpit platform include a Sunday-school room, several class or committee rooms, and a number of toilets. The interior draws rather more heavily upon Italian precedent than is usually the case with a Georgian church, for the ceiling is vaulted and of plaster rough in texture and of a russet gold in color, the window penetrations being carried by corbels. The interior trim is of a deep ivory, the rails of the pews being of Spanish walnut. Window draperies are of silk rep, soft russet in color with a suggestion of old blue in the folds of the material. The three hanging candelabra and the wall brackets which light the church are of wrought iron. The disposition of the choir gallery and the reading desk or pulpit, tasteful as it is, is merely temporary and is to be re-arranged later on.

EDITORIAL COMMENT

WILL THE ENGINEER SUPERSEDE THE ARCHITECT?

THE past few years have seen developments in the professional service of designing buildings that make it natural to wonder if the architectural profession is advancing or losing ground. Certainly there is ample evidence, especially in the East, that the field of practice for engineers and engineering-contracting organizations is constantly widening and embracing types of building that were formerly considered the architect's undisputed province. The growth of building practice among engineers came about in the last decade, or more primarily because of our large industrial development and the increasing use of reinforced concrete for the buildings needed for using it. Reinforced concrete presented a problem well suited to the engineer, and industrial building was nothing more than the enclosing of certain volumes of space with the type of construction most efficient from both cost and maintenance viewpoints.

Following the war there occurred a decided slump in industrial building, and engineering organizations that had been operating in a large way with expensive overhead costs were obliged to find other fields or go out of business. It was but natural for them to turn to office, bank and other commercial buildings that were in demand. In some instances they have not hesitated to solicit commissions for educational and institutional buildings. The fact that they have in many cases been successful in securing this work does credit to their business acumen, but it proves distinctly that the architect has not made the value of his service known to the public.

When one considers comparisons between architecture and structural engineering it is well to admit at once that engineers can construct fully as well and in many cases better than architects. Structure is their chief concern, and their knowledge of the strength of materials and the forces at work in a structure is superior to that of architects. The realization of this through their contact with architects has made it seem to them that they possess the strongest asset in the requirements for practice, and that it would be comparatively easy to supply the apparent part played by the architect in the design by adding to their organization a group of architectural designers. They have secured their opportunities to build by means of good, direct salesmanship—a factor in modern business that the architect has shrunk from adopting because it necessarily means self-appraisal of one's value.

The points on which the engineers can and do claim superiority to many architects are just the features of a building operation that are obviously understood by a client and have, therefore, his immediate interest. He knows that there is a difference between good and bad construction; he knows that there is a difference in cost between different materials; he realizes that good superintendence will insure a better building; he knows that businesslike methods in following contracts and payments will avoid losses, and these are the points of service stressed by the engineer.

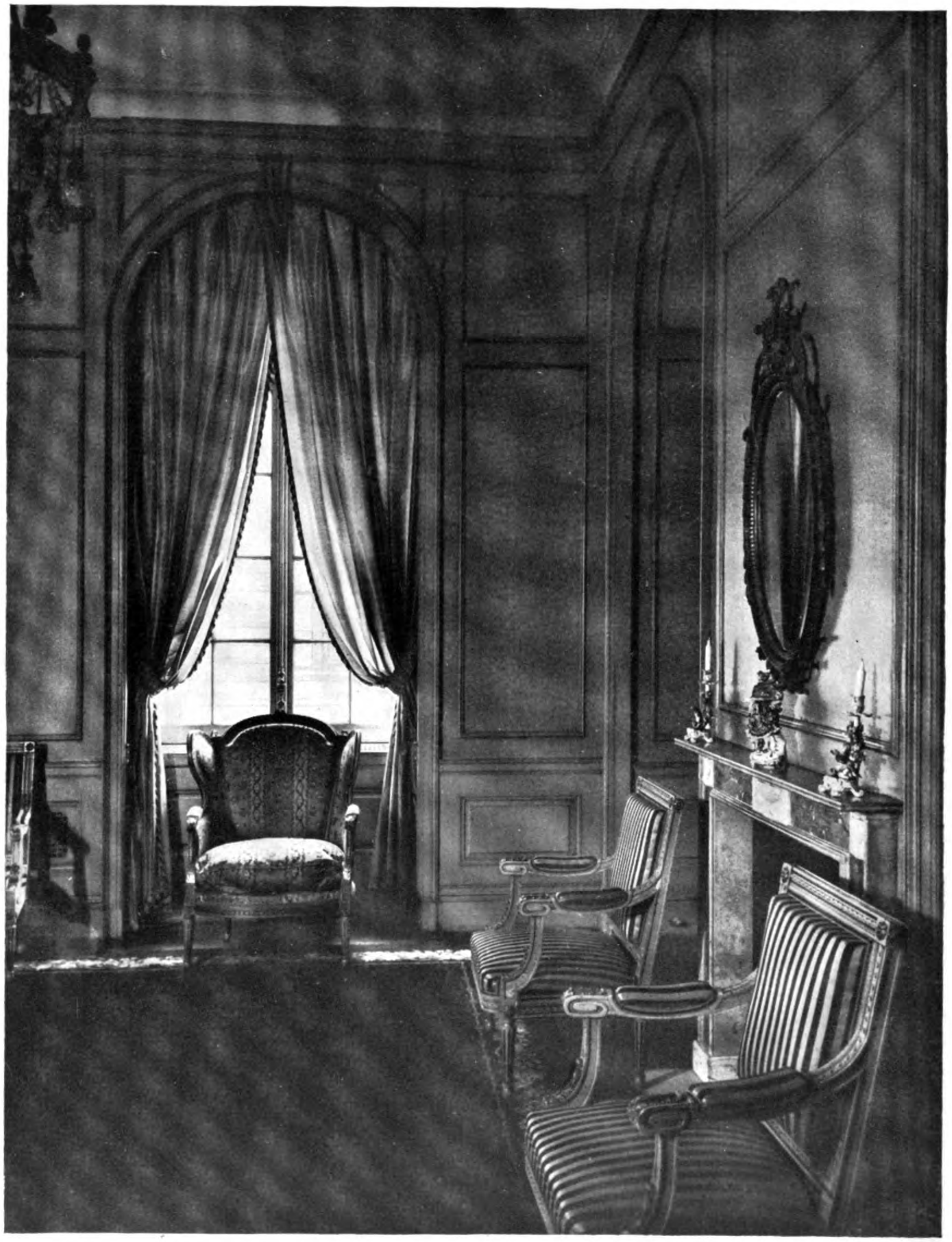
Unfortunately for the architect, the value of his services lies along lines that cannot be so readily measured, and the client has little or no appreciation of them. He doesn't realize sufficiently that his building is a vital part of the business, institution, or whatever is housed within it, requiring a distinct, and individual plan to fit the particular needs. This is where the architect's service is superior to the engineer's, and it is the root of all successful building. The various advantages the engineer offers can be provided by any architect capable of creating an organization or intelligent enough to secure expert advice when needed, but the fundamental requirement for good building—the ability to plan—belongs to the architect, and it is something that does not function well in an employe.

Blame cannot be placed on the engineers; they have developed their service openly and they have in the majority of cases provided their clients with buildings that compare with their expectations. The field is open to any and all who can serve it. The difficulty is one that the architects must meet themselves; they must decide if architecture as it is practiced today is to become separated from the business world and employed only in the case of monumental buildings or special work for wealthy individuals where art is the prime consideration and business principles do not count.

It is assumed that any individual or firm practicing architecture must provide all that the engineer does and more, and with this fact capable of proof, serious efforts must be made to show the public wherein the architect's service has special value and why such service can be supplied only by an architect. This message can be conveyed to the public through regularly organized effort of architectural societies and by the individual architect, not necessarily by printed advertising in the case of the individual, but by showing no hesitancy in meeting the engineer in open competition and by presenting his claim for consideration in a businesslike manner that is understandable to the average man. Considerations of beauty will always be paramount with architects, but these are difficult of explanation to the public, and when the architect lays greatest stress on this phase of his client's problem, he opens the way for others to approach and make capital of the points he has left uncovered.

DECORATION
and
FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS



AN INTERIOR FROM THE COLONY CLUB, NEW YORK
DELANO & ALDRICH, ARCHITECTS

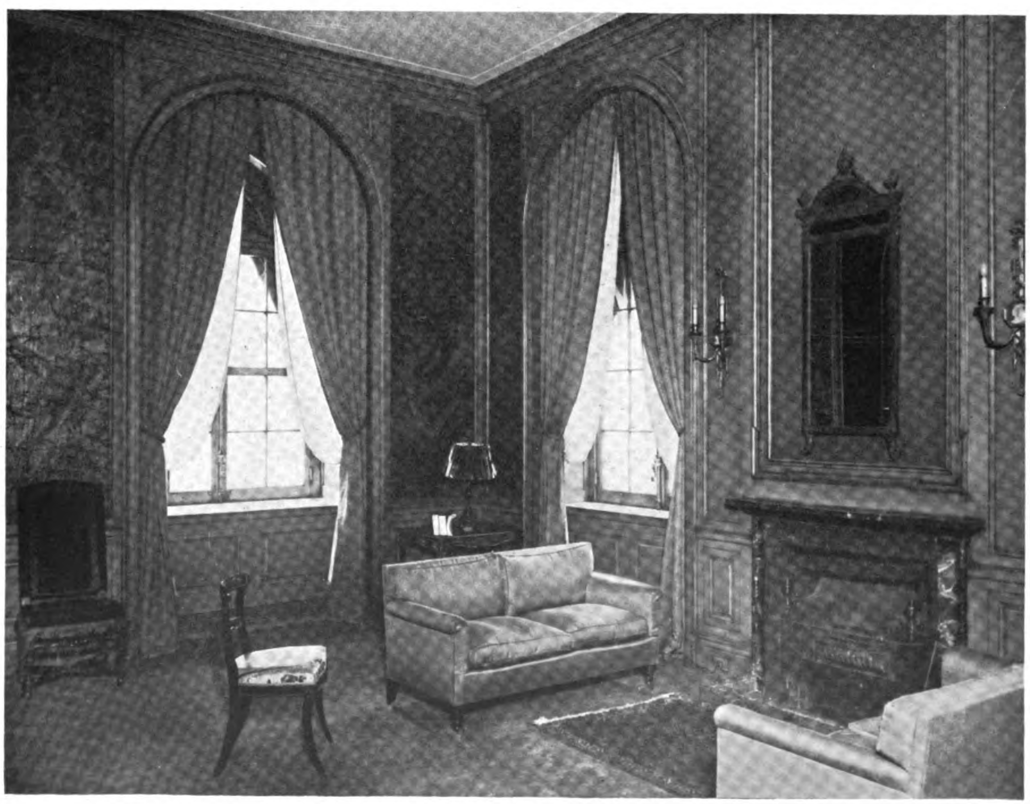
A Plea for the Architect's Interest in Textile Fabrics

II. WHAT GOVERNS THE SELECTION OF A FABRIC

By HORACE MORAN, INTERIOR DECORATOR

MUCH interest attaches to the use of textile fabrics in interiors, and many failures may be laid at the doors of those designers who have not found wherein lies that interest. It is safe to assume that most interiors are designed without more than a casual consideration (or none at all) of the kind of fabrics or even the color of the fabrics which are sure ultimately to take their places in the scheme. Yet the very area of fabric used, if only for curtains and seat coverings, may materially affect the general composition, whereas with walls of fabric added the weaver's art may almost dominate the decorative effect of the interior. This seeming lack of appreciation is a natural consequence in the evolution of a structure for habitation, for the house is long in the building and involves many questions of cost before it is ready for furnishing. Then again, it is an unwritten law of residence designing that the wife of the client shall have much to say as to the curtains and other textile fabrics to be selected.

If then, the product of the loom is to be selected at the eleventh hour the designer, whether architect or decorator, should all the more be prepared with a store of knowledge and experience to decide quickly but intelligently when the problem reaches this stage. He may then stand off from his room, as a painter would from his picture, and untrammeled by natural laws that controlled him in building the structure, or traditions as to architectural design, select a fabric for the æsthetic elements it has which are needed to complete the composition. What then are the elements to consider as the basis for the selection? Texture of surface, apart from all thought of design or color, will first of all determine the selection of the kind of weave, either silk or wool, linen or cotton. It will decide as between luster and dullness of surface, between fineness of texture or loose, open weave. There is the danger of course of attempting to formulate rules as to texture which although a possible guide to salesmen would never be tolerated by the independent mind of the artist. For instance, the controlling surface value of sixteenth century tapestries on the walls would seem to suggest that curtains of wool or other lusterless texture would have the appropriate quality in the same room. Experience has shown that the eye is not at all pleased with such strict consistency, but



An Interior Designed by Delano & Aldrich, Architects

An Interior Designed by Delano & Aldrich, Architects

rather with the complete contrast of texture brought about by using silk damask, a material of close, fine weave with a splendid luster—and all this in a room with dull plaster walls and even a heavily timbered ceiling. This combination of textures however does not admit of the damask's competing in design with the tapestry, but rather it should be of a solid color with its pattern large in scale but asserting itself only because of the different texture of the ground. Tapestry and velvets will live in harmony upon similar terms, and yet as an illustration of the result of entrusting such fabrics to profane hands, witness the almost repulsive effect of combinations of tapestry and velvet as sometimes used on furniture seen in the shops, or the pathetic result of the effort of a decorator to increase the area of a wall hanging by sewing a border of velvet around a tapestry.

Color, as the second element, includes also the absence of color, as it may be that the textiles used must not detract in any way from the colors introduced in the structural features, but serve only a useful purpose. The trade nomenclature of textile colors is meaningless to the artist, for it is the tone or shade of a color and its inclusion of other colors, as well as the effect of the natural or artificial lighting in place, which interest him. Nor is this all, for he will only pass upon a fabric when he has seen it in folds, if it is to be so hung, and this partly because its color is affected by shadows, as well as for a reason to be set forth in the next question to be considered.

Design, the third element, when small enough to be without evident scale, almost becomes a texture and should be considered as such. In this group of fabrics are included the minute patterns which are an inch or two in area, and which although of contrasting colors are not of a size to allow the eye to follow a general design.

The dominant feature of design, scale, is not so insistent in fabrics as in the architectural elements. As an illustration, a damask may be designed with a motif recurring every meter and a half, possibly allowing but two such patterns in the height of a curtain. Such a fabric, if of one color with the pattern well distributed and of many details, would take its place readily in a room small in size and in which the other features enjoy the finest of scale. A fabric woven with the ground and pattern of different colors, with the details of the pattern large in mass, demands that its scale be considered, as it will assert itself most forcibly. It is not the size of the pattern, even when strongly contrasted with the ground, that determines its scale, for a large pattern may be made up of small units well distributed over the surface, or else there may be the absence of a repeating pattern as in the oriental designs of long but attenuated trees and vines now commonly seen in printed linen and cotton fabrics which may be in keeping with the most dainty interiors. In the paragraph on colors is mentioned the effect of a fabric seen in folds. No material of strongly contrasting colors and large pattern if to be used in folds will tell its real value if seen on one plane, and it is hardly necessary to explain how these two positions modify the design and color value. A much too prevalent practice today is that of selecting the fabrics for a residence (usually the small suburban house or city apartment) and taking from these fabrics the colors for the painting of walls and furniture. Such fabrics are frequently of printed material and subject to rapid fading which soon leaves the painted features retaining the original bold colors, while the fabrics become mere ghosts of their former selves and have to be replaced with a new lot of the same materials if they are still on the market.

The architect trained to conventionalizing should accept with pleasure the tendency of fabric makers to avoid the naturalistic floral fabrics, our heritage from the eighteenth century, and to seek designs which show an effort not to copy Nature but to suggest her forms and colors in design. How far this will go depends upon the encouragement given by the architect and decorator.

In this country we have fortunately almost passed the stage of slavish copying of the interiors of other times, and designers, both architects and decorators, approach the problem as a void to be appropriately

TWO INTERIORS DESIGNED BY DELANO & ALDRICH, ARCHITECTS

treated with form and color, with due respect for the influence of the light of both day and night. The usual convention which has in years just past led to the assumption that certain types of interior demand fabrics known to have been used in such interiors, is forgotten; now fabrics are selected not because they represent a particular epoch, but because they will lend what is needed in texture, color and scale of design.

In all the periods of good interior design, although all the structural elements reflected the architecture of the time, the textiles used did not necessarily show the same influence. Commonly the looms of other countries furnished the hangings. The silks as well as the floor coverings of the orient commonly found their way into occidental rooms; in fact the designers of the past showed great freedom in the selection of fabrics. A marked illustration of this was the introduction of Chinese materials into the English homes of the eighteenth century. It would seem to have been understood that the textile, not being a part of the structure but rather a live element added to it, could be selected from the looms of any land if it furnished the needed decorative value and served a useful purpose.

Many scientists in France and Germany have sought by futile efforts to establish a scientific basis for color relation, and the designers of fabrics working only on a plane surface have been tempted to stray occasionally into this field of research. No such efforts result in the production of works of art, and they are of as little avail as would be the same process applied to an architectural composition or a picture. Any successful product of the loom which has the interest of both color and design shows at once that it was conceived in joy. There may be colors which by convention are agreed upon as the proper contrast to other colors, and the same applies to forms, but beyond this there is the gamut of colors and forms, the relation of which in the preparation of a design can be felt only by the designer.

Admitting that the designer of fabrics is not restrained by structural requirements or a conservative color range, as in an architectural composition, all fabrics to be used in the structure should be without eccentricities of texture, pattern or color. Too commonly are seen rooms in which the curtains seem to be the only strong color note. The eye, like the moth, is thus drawn towards the windows, the source of light, and away from the room which should be of greater interest.

To sum up: those things which govern the selection of a fabric are its texture, color and design, and that subtle quality of appropriateness which to the artist gives it the desired decorative value in his composition.

The six illustrations accompanying this article have been selected from a number of residences designed by Delano & Aldrich. They illustrate to a marked degree how an architect trained in the use of textiles will instinctively apply in the most subtle manner the principles which govern their selection.

An Interior Designed by Delano & Aldrich, Architects

SERVICE SECTION

of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

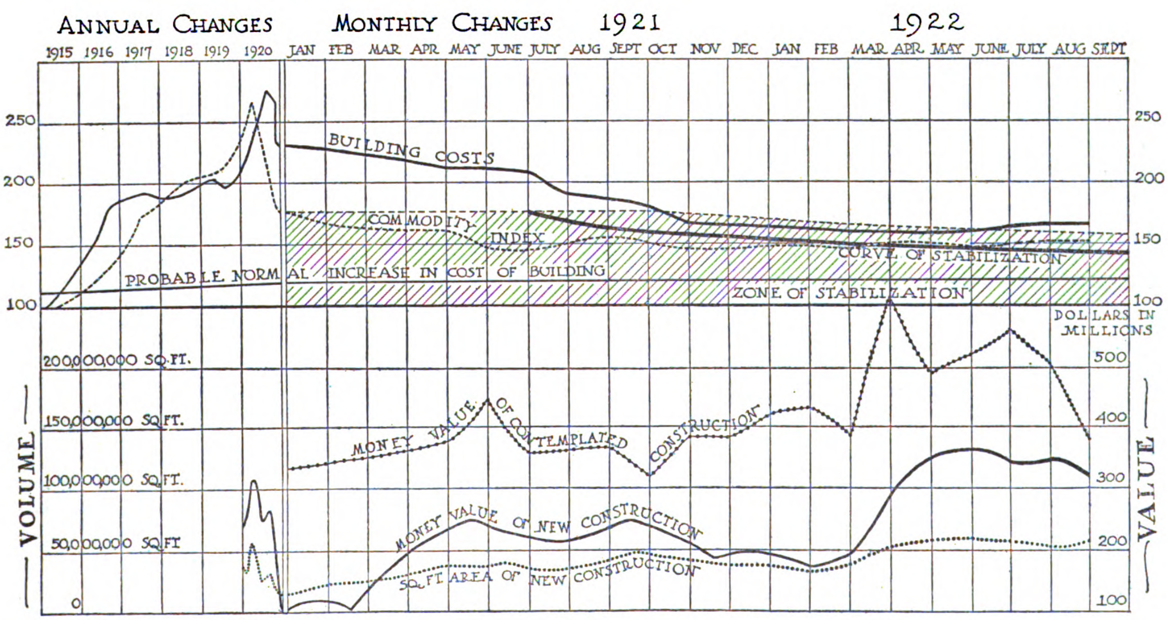
The Building Situation

As will be noted by examining this chart, the month of August recorded a definite drop in contemplated building construction, while the volume and value of actual contracts let are not greatly under the figures for July. This drop in contemplated construction has been in business, industrial, residential and public buildings.

Contemplated construction in the month of August showed an increase over July in educational buildings, hospitals and institutional buildings. The greatest decrease under July figures was in the classes of industrial buildings and in public works and public utilities. To a great extent this is a seasonal condition, and it is interesting to note that in spite of rising prices there has been only a slight decrease in general classes of contemplated construction.

The cost of building is still in the upturn, and it is certain that if this continues to climb there must be some reduction in building activity. On the other hand, we have the encouraging fact that the disturbance caused by the coal and rail difficulties is tending toward settlement with consequent relief to the building industry. It is quite probable that prices will continue to rise through the late fall and in the winter, but it is confidently expected that with the resumption of normal conditions in the building field a great volume of production will replenish the stocks of building material dealers and re-establish prices for spring building activity on a basis comparable with the similar period of 1922.

It is quite certain that many projects are now being overhauled for the 1923 building period, and in every section of the country architects are reporting an increase of planning activity, and every office looks forward confidently to a busy season during the coming winter in preparation for the spring building.

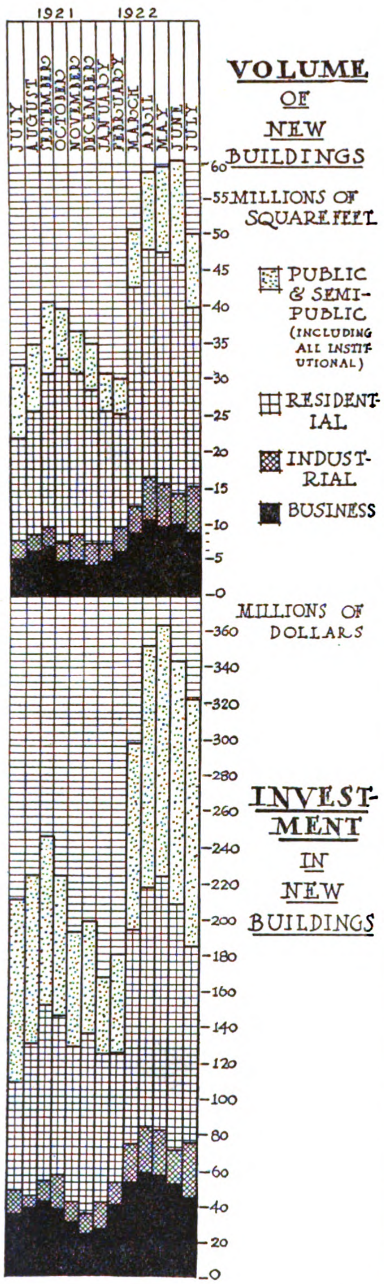


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

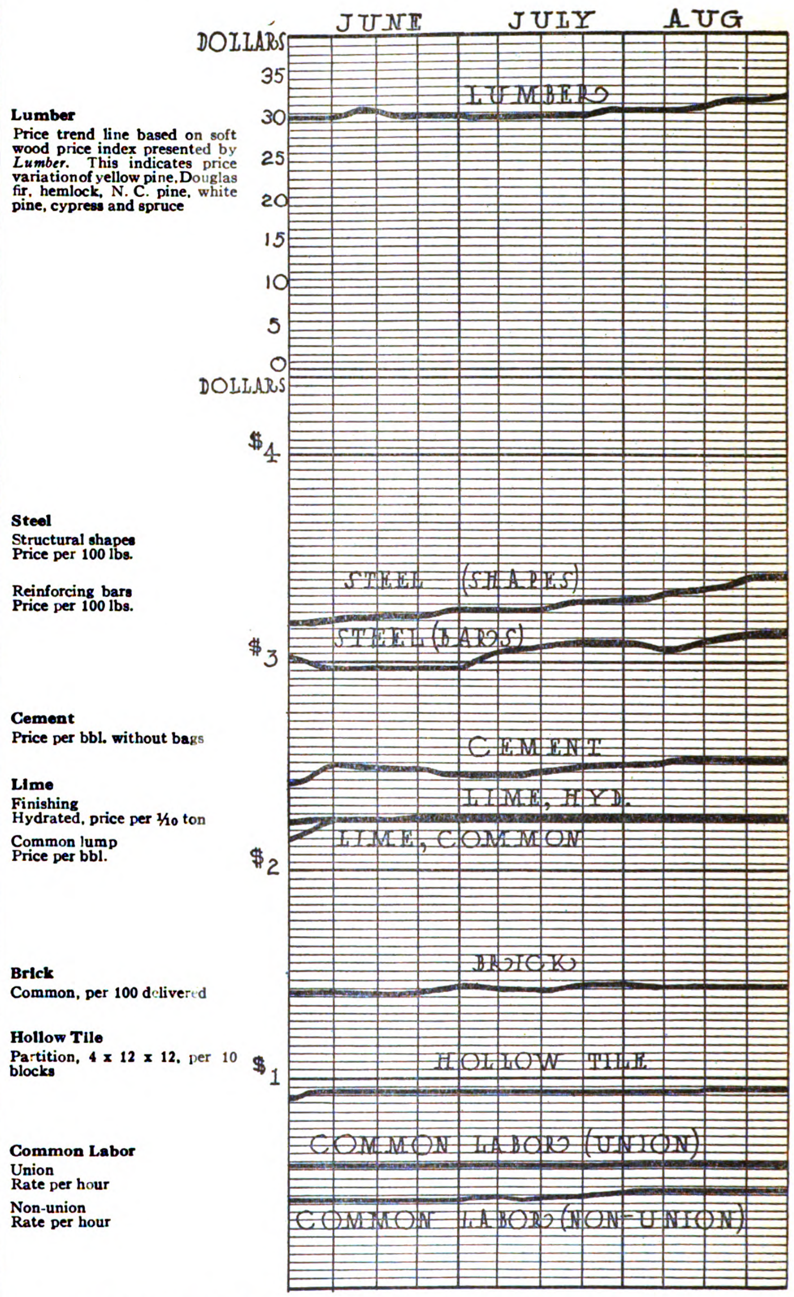
The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in the prices of a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line as shown on the preceding page.

The volume and investment chart shows the beginning of the seasonal slump, following the large amount of building in all classes put under contract in June. The increase in industrial building is indicative of better business conditions, and the decrease in residential work is partly seasonal and partly due to steadily rising construction costs.

The material chart at the right records the effects of the coal and rail strikes in the inevitable curtailment of production and increase in prices. These are particularly evident in steel, cement and lumber. All steel products have shown steady increases due to the coal difficulty, and the recent 20 per cent increase in common with labor rates. Lumber is seriously affected by the rail situation and is also influenced by steady demand. Building materials prices are said, on the authority of the United States Department of Labor, to have increased 10 per cent within a year, and in this increase lies the danger of another serious let-up in construction.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of Aug. 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitchburg	Mass. Haverhill	N. Y. Buffalo	Penn. Pittsburgh	Penn. Erie	Md. Baltimore	Va. Richmond	W. Va. Fairmount	S. C. Columbia	Fla. St. Petersburg	Ga. Savannah	Mich. Detroit	Mich. Pontiac	Mich. Bay City	Mich. Saginaw	Wis. Milwaukee	Iowa Waterloo	Iowa Des Moines
Common Brick		1,000	$18.00	$25.00	$18.12	$16.00	.....	$20.00	$18.00	$24.00	$12.00	$18.00	$13.50	$16.50	$14.40	$13.00	$12.50	$12.00	$18.90	$16.00
Portland Cement	Excl. of containers	Bbl	3.00	3.50	2.78	2.85	$3.20	2.85	3.50	2.60	3.50	3.60	3.50	3.20	2.29	2.38	3.00	2.40	2.60	.....
Yellow Pine No. 1	Dimension 2x4-16′ S1S1E	M	.....	65.00	.....	50.00	49.00	39.00	28.50	45.00	.....	30.00	25.00	50.00	43.00	37.00	50.00	37.00	45.00	44.00
Douglas Fir No. 1	Dimension 2x4-16′ S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50.00	.....	.....	.....	40.00	45.00	44.00
N. Carolina Pine No. 1	Dimension 2x4-16′ S1S1E	M	.....	.....	.....	.....	.....	.....	28.50	45.00	22.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	50.00	42.00	.....	47.00	50.00	.....	35.00	60.00	.....	30.00	.....	50.00	.....	35.00	.....	33.00	45.00	42.00
Y. P. Flooring E.G."C"	1x4-10′-16′	M	108.00	.....	.....	72.00	110.00	125.00	72.00	100.00	75.00	115.00	.....	80.00	.....	.....	.....	85.00	80.00	.....
Douglas Fir V.G. No. 2	1x4-10′-16′	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80.00	.....	.....	.....	85.00	80.00	95.00
Red Cedar Shingles	Extra clear 16″ 5 to 2	100 sq. ft.	6.25	7.00	6.00	7.00	6.50	14.00	.....	.....	5.60	.....	.....	7.50	6.50	6.50	6.50	5.00	6.50	6.00
Cypress Shingles	Extra clear 16″ 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	8.00	5.60	.....	.....	7.50	.....	.....	.....	.....	6.50	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	8.00	.....	6.25	5.50	.....	6.50	6.75	6.25	7.25	6.50	7.25	6.00	6.00	6.50	6.50	7.50	.....
Gypsum Plaster Board	⅜″	1,000 sq. ft.	.....	50.00	45.00	37.50	45.00	.....	42.00	32.00	45.00	.....	40.00	30.00	40.00	40.00	.....	30.00	32.00	35.50
Lime	Hyd. Com.	Ton	20.00	22.00	.....	20.00	20.00	15.00	16.50	15.00	20.00	.....	22.00	.....	15.00	17.00	.....	.....	25.00	27.50
Building Sand		Cu. yd.	2.00	2.50	.95	3.10	.....	2.00	2.20	3.75	1.00	2.00	2.00	2.75	1.50	2.10	1.75	2.00	1.75	.....
Crushed Stone	¾″	Cu. yd.	3.00	3.00	1.30	5.50	3.00	.....	3.00	4.50	3.25	6.25	5.00	2.90	1.48	3.75	3.60	2.35	3.50	3.00
Window Glass	Single A 10″x12″	50 sq. ft.	4.50	.....	3.90	.....	.....	5.40	3.85	6.00	3.45	.....	.....	.....	.....	5.15	5.20	.....	6.00	4.50
Hollow Tile	8″x12″x12″	Each	.24	.20	.22	.20	.20	.21	.18	.21	.19	.20	.....	.21	.17	.15	.16	.12	.13	.....
Cast Iron Soil Pipe	4″ E.H. 13 lbs. per ft.	Ton	.....	.....	58.80	53.76	.....	74.00	55.00	78.00	.....	.....	.....	.....	52.00	51.00	51.00	.....	50.00	.....
Steel Pipe	1″ galv.	100 ft.	.....	10.00	10.00	8.16	.....	8.74	8.50	10.00	.....	.....	.....	12.00	8.50	9.25	9.50	.....	12.00	9.37
Reinforcement Bars	¾″ square	100 lbs.	5.25	2.50	.....	3.00	.....	2.75	2.50	2.50	3.50	5.00	3.00	3.50	2.40	2.25	2.30	2.25	3.20	2.68
Structural Steel	Fab. 6″ I-beams	100 lbs.	4.00	5.00	3.20	2.55	.....	.....	4.15	4.25	4.00	.....	.....	3.25	2.25	3.05	3.40	2.35	4.70	2.88
Gypsum Plaster	Neat	Ton	22.00	22.00	.....	22.00	24.00	20.00	20.00	17.00	20.00	22.50	.....	14.00	13.90	14.00	.....	16.00	18.00	13.50
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	13.50	.....	.....	13.50	13.50	.....	20.00	.....	.....	17.10	16.50	17.00	.....	16.00	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	4.50	2.50	2.00	1.95	2.00	.....	2.50	.....	1.75	2.25	1.90	.....	2.75	2.60	2.75	3.65	3.75	2.63
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.25	1.80	1.05	1.20	1.00	1.25	.....	.90	1.50	1.50	.75	.....	1.00	1.05	1.00	.....	1.50	1.08

Commodity	Size or Condition	Unit	Iowa Council Bluffs	Mo. St. Louis	Mo. Kansas City	Ill. Chicago	Ohio Cleveland	Ohio Akron	Ohio Youngstown	Ohio Dayton	Ohio Toledo	La. Shreveport	Texas San Antonio	Ariz. Tucson	Wash. Seattle	Wash. Spokane	N. Dak. Grand Forks	S. Dak. Aberdeen	Calif. San Jose	Calif. Sacramento
Common Brick		1,000	$16.50	$14.50	$16.50	$11.00	$16.00	$16.00	$14.55	$17.00	$15.00	$15.00	$14.00	$12.50	$20.00	$13.00	$18.00	$16.00	$19.00	.....
Portland Cement	Excl. of containers	Bbl.	2.42	2.60	2.70	.....	2.92	2.81	.....	2.68	3.28	3.50	3.20	4.40	2.90	2.98	3.20	2.70	3.36	$3.30
Yellow Pine No. 1	Dimension 2x4-16′ S1S1E	M	43.00	43.00	40.50	37.00	55.00	45.00	45.00	45.00	46.00	43.00	45.00	.....	.....	.....	45.00	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16′ S1S1E	M	43.00	46.50	40.50	.....	.....	.....	.....	.....	.....	.....	.....	55.00	20.00	.....	45.00	44.00	42.00	39.50
N. Carolina Pine No. 1	Dimension 2x4-16′ S1S1E	M	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M	42.00	46.00	48.50	31.00	47.00	45.00	45.00	.....	42.00	48.00	48.00	50.00	20.00	27.00	.....	41.00	42.00	36.50
Y. P. Flooring E.G."C"	1x4-10′-16′	M	96.00	68.00	75.50	.....	88.00	115.00	85.00	90.00	75.00	78.00	75.00	.....	.....	.....	95.00	.....	.....	.....
Douglas Fir V.G. No. 2	1x4-10′-16′	M	93.00	.....	88.00	.....	.....	.....	.....	.....	.....	.....	.....	92.50	56.00	70.00	.....	81.00	75.00	76.50
Red Cedar Shingles	Extra clear 16″ 5 to 2	100 sq. ft.	5.40	6.83	6.00	.....	5.76	7.00	7.00	5.20	5.80	.....	8.00	.....	3.65	.....	7.00	5.75	5.00	5.15
Cypress Shingles	Extra clear 16″ 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.97	.....	6.50	.....	.....	.....	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	6.37	5.80	.....	.....	.....	.....	6.00	6.75	6.93	8.00	.....	.....	.....	8.00	8.00	.....	7.00
Gypsum Plaster Board	⅜″	1,000 sq. ft.	.....	39.50	.....	.....	45.00	.....	50.00	32.50	37.50	45.00	52.00	55.00	34.00	.....	.....	.....	45.00	.....
Lime	Hyd. Com.	Ton	19.00	23.20	25.60	14.70	14.80	17.60	14.10	14.00	18.00	27.50	22.50	.....	20.00	20.00	28.00	25.00	25.00	.....
Building Sand		Cu. yd.	3.50	2.56	2.37	2.25	2.50	1.75	.....	1.80	2.81	2.00	2.75	1.15	1.75	.....	3.00	3.25	2.50	1.25
Crushed Stone	¾″	Cu. yd.	3.60	.....	3.00	2.25	3.50	3.25	.....	2.50	3.00	4.00	2.60	3.00	2.00	.....	3.50	.....	2.25	2.75
Window Glass	Single A 10″x12″	50 sq. ft.	.....	3.90	4.50	.....	.....	4.20	4.50	4.50	.....	4.50	5.40	.....	4.42	4.43	.....	.....	.....	4.63
Hollow Tile	8″x12″x12″	Each	.....	.....	.22	.....	.....	.18	.14	.18	.....	.25	.21	.18	.25	.20	.19	.10	.....	.....
Cast Iron Soil Pipe	4″ E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	.....	.....	.....	65.00	.....	59.00	59.00	76.00	75.00	.....	.....	.....	.....	.....
Steel Pipe	1″ galv.	100 ft.	.....	.....	.....	.....	.....	8.36	8.27	8.57	.....	9.40	9.40	11.25	12.00	11.03	.....	.....	9.85	9.90
Reinforcement Bars	¾″ square	100 lbs.	3.05	.....	.....	.....	.....	2.95	.....	3.00	.....	4.00	3.75	4.00	3.00	3.85	4.67	.....	4.25	3.05
Structural Steel	Fab. 6″ I-beams	100 lbs.	3.45	3.85	3.80	.....	.....	3.25	3.90	3.25	.....	4.00	.....	.....	5.00	.....	6.77	.....	6.00	4.30
Gypsum Plaster	Neat	Ton	18.00	18.50	.....	.....	.....	16.30	22.00	19.00	.....	24.00	24.00	23.00	21.00	20.00	.....	20.00	20.00	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	.....	11.00	14.00	16.50	.....	12.00	.....	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	3.10	.....	.....	.....	2.50	.....	2.15	2.25	.....	2.60	2.58	3.25	.....	2.30	2.85	2.25	.....	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.65	.....	.....	.....	1.10	.....	.....	1.15	.....	1.50	1.80	1.75	1.20	1.05	1.50	.....	1.50	1.00

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(*b*) That no Committee member has affiliations with any manufacturer;
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Address inquiries to committee members, care THE ARCHITECTURAL FORUM, 103 Park avenue, New York

THE FORUM DIGEST

A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

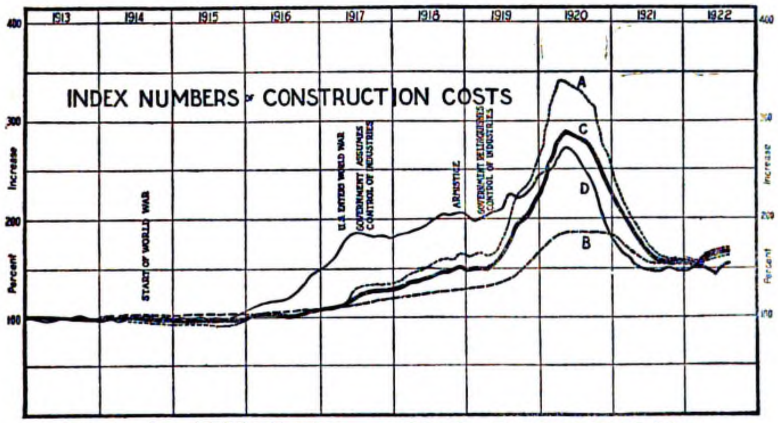
NEXT YEAR'S BUILDING COSTS

FROM *Building Topics*, the publication issued by Monks & Johnson, architects and engineers, of Boston and New York, we clip these paragraphs on the indication for the cost of building:

There are three general divisions of the cost of finished buildings:

(1) Material Cost, (2) Building Trades Wages, (3) Efficiency of Building Trades Labor.

Since March of this year, building-materials cost has been increasing. The March index-figure of the United States



Curve A — Cost of Building Materials
Curve B — Wages of Building Trades
Curve C — Cost of Completed Buildings
Curve D — Cost of all Commodities Combined

Department of Labor is 155, referred to the average of the year 1913 as 100. In April the index rose to 156; May, 160; June, 167; and the July figure was 170. This makes a 15-point rise since March. The primary reason for this increase has been the demand brought about by the large volume of building which always accompanies an upward swing in the business cycle. A secondary cause for this increase in material cost has been the coal strike. Brick and steel, and in fact every other building material dependent upon coal in manufacturing, have been raised very considerably over the figures that would have obtained if the coal miners had been at work since last April.

There are three general fluctuations in prices which are always in operation. The first of these is the very long-time trend. This is a slightly rising movement and has been due in the past primarily to the gradual increase in the amount of gold and silver in the world. It is in general because of this trend that wages, for instance, are so much higher now than they were in colonial times. However, the effect of this gradual increase is slow from year to year, or even from decade to decade, and it becomes noticeable only after the lapse of a very considerable period of time.

The second trend in prices is the slow and steady fall which has always occurred after a war, and which may be expected, through historical analogy, during the next 20 years. It is on this trend that so many people are placing their expectations of lower prices next year and the year after, but while it is undoubtedly a fact that this movement is now in operation, there is a third element of price fluctuation which they may have not taken into account.

This element is the normal business cycle. The business cycle appears to have fluctuated in normal times with a period, roughly, of from three to four years between peaks. It has been caused in the past through the normal operation of the laws of supply and demand, as affecting the thrift and industry of the people, the availability of loanable funds, and thereby credit, and the movements of public confidence. From peak to low point, the fluctuation within any one business cycle has almost always been greater and more violent than in other movements affecting prices. We are now on an upward movement in the present business cycle, which began a little time before the first of this present year. Unless some totally unexpected and untoward events prevent the normal upward movement of the cycle, we should expect constantly improving business, constantly increasing demand, and as a result, upward movement of prices, until the end of this cycle.

It now costs 15 to 20 per cent more to build than it did in the first part of March of this year. We do not think it likely that lower building costs will obtain for at least 18 months.

THE QUESTION OF RENT REDUCTIONS

IN a recent issue of *Forbes' Magazine* a number of interesting comments were made by John Oakwood, relative to the downward revision of rents and real estate values. He says: "The housing shortage in the United States has passed its acute stage. The greatest building boom in the history of the nation has driven away this chimera from domestic life. The prospects for this fall's renting season are for a larger volume of houses to choose from, greater competition for tenants, and a consequent further easing of rents which has already made substantial progress in some places.

"The cost of homes for purchase has made even greater progress toward normal than have rents. Lower building costs as compared with the peak period, a slowing down in the rate of buying, easier money for financing homes, the coming of distress property onto the market, and a surplus of houses for sale even while the renting property shortage continued, all contributed to bringing down prices. The prospects are for easier conditions also in the purchase of property this fall, and for a more marked decline in values next spring.

No Collapse in Sight

"*But in neither case—that is, in the cost of homes or in rental—is there a collapse in sight.* Neither is there a prospect of a return to inflated conditions. There is a distinct advance evident at the present moment in building costs, due both to the paring down of stocks of materials by the tremendous, record-smashing volume of building this year, and also in some sections to retarded distribution due to transportation difficulties. Likewise labor scarcity in some directions has raised prices. But the ultimate solution of the labor situation, the full swing under which the building materials producers are now operating, and a lessening pressure for houses may be expected to prevent this upward trend from going much further. There are evidences, in short, that the building and housing situation, although bound to see-saw somewhat yet, is re-

turning toward equilibrium and that the next two renting seasons, that is, this fall and next spring, should go far in the direction of normal stability.

"Rents will remain higher, building materials will be dearer, homes will be more costly to purchase than they were before the war, but so are general price levels and wages higher. Therefore, in coming to comparative rest at points above the 1913 level, housing figures will merely be conforming to the new normal.

"In New York, where the housing crisis was very acute, total construction contracts awarded during the first six months of the year totaled $305,700,000 —more than double the amount for the first half of 1921. Of this huge total, 58 per cent was for residential construction, estimated as representing housing provision for 105,000 persons.

"The general movement of lumber thus far in 1922 has been in excess of that in the same period in 1920, the best year previously recorded. The cut, however, has not been so great; so that there has been a reduction in reserve stocks.

"Similar conditions prevail in other building material lines. For cement, production in the first six months of 1922 is reported as running 10 per cent above last year, with shipments 20 per cent higher; so that stocks have been considerably reduced. Brick orders are also reported far in excess of supplies on hand.

"The natural result of these conditions, along with increased labor and manufacturing costs, has been rising prices. Since it is estimated that labor constitutes 40 per cent of building costs in residence construction, wage changes are an important element, and the labor outlook is a controlling consideration in judging the building and construction outlook.

"The wholesale building materials price index number of the Bureau of Labor Statistics has advanced from its post-war low point of 155 made in March this year, to 167 in June. In this index, the 1913 average is the base of 100. The peak of this index was 300, reached in April, 1920. Thus, though current prices are 67 per cent above the pre-war level, they are 133 points or 44 per cent below the post-war peak. The course of this building index during the nation's greatest building era comprised in the last two years and a half is shown in the following:

Building Materials Index

	1920	1921	1922
Jan.	274	192	157
Feb.	293	180	156
Mar.	297	173	155
Apr.	300	167	156
May	293	165	160
June	275	163	167
July	269	160	
Aug.	265	156	
Sept.	255	156	
Oct.	240	159	
Nov.	215	163	
Dec.	204	158	
Year's Ave.	264	165	158.5

"The course toward higher levels of two leading building materials since the first of the year, typical of other materials, is shown in the following:

1922	Yellow pine	Brick
Jan.	49.50	15.00
Feb.	49.50	17.50
Mar.	49.50	18.00
Apr.	49.50	16.50
May	51.50	16.50
June	51.50	20.00
July	53.00	20.00
Aug.	53.00	21.00
1921		
Aug.	47.00	18.40

"The foregoing picture of boom activity and rising building costs may seem to imply the development of a new inflationary situation.

"There is little probability of re-inflation in this field. Inflation here has gone the way of inflation in industry, commerce and finance, and there are forces to prevent its return. The expansion in building activity is the direct outcome of an accumulated demand resulting from the war and post-war years when the normal annual increment to the nation's housing and building equipment was not made. As this accumulated shortage is reduced, building activity will return to a normal scale, keeping pace with the annual requirements arising from increased population and depreciation of existing structures.

"There are indications that excessive building activities have started to reduce the abnormal housing deficit. It is partly on these indications that the forecast for easier rents and more moderate purchase prices for residence property is based.

"The indications of a reduction in the cumulative shortage that piled up during the war and post-war years of curtailed construction are found in the following facts:

Eight Years Before Normal

"It is estimated that normally the homes required by the nation each year to accommodate increased population total about 325,000 and that 275,000 new houses are needed to replace aged or destroyed structures, making total normal requirements of some 600,000 a year. It is estimated that only 260,000 new homes were built in 1920; 525,000 were built in 1921; and that fully 785,000 will be the total for 1922.

"This indicates, therefore, that the building of homes this year will be about 30 per cent in excess of the normal requirements of 600,000,—some 185,000 homes, in other words, to be applied in cutting down the accumulated deficit of the underproduction period.

"Just how large this deficit was it is impossible to say, but guesses have gone as high as the equivalent of two and a half years' normal requirements, or 1,500,000 homes.

"Accepting this high figure without qualification, it would take between eight and nine years to wipe it out if the rate of surplus house production established this year were maintained.

"But there are other important social factors to consider besides these bare statistics. One of the most important is that the emergency demand for houses brought almost to an end the abandonment and destruction of houses because of age or disrepair.

"Fifty years has been called the average age of a dwelling, but this average did not hold in the crisis. Multitudes of old and dilapidated dwellings that would ordinarily have been scorned were re-conditioned. Although statistically they all theoretically appear above on the debit side of the account, as a matter of fact many of them have remained in use—in many cases in increased use through additions.

"The immediate past holds guidance for the future. It will be remembered that the beginning of the building boom was retarded and did not gain full swing in 1920 due to the persistence of high prices in the building material and labor costs. Materials producers and building trades workers fancied they had the public by the throat, that housing was a necessity in which there was a tremendous shortage and that almost any prices could be demanded.

"Greed defeated itself. The building program for a time almost stopped. This was caused not only by some builders realizing that the public was being driven to adopt new living habits that would be reflected ultimately in a softening of demand for homes, but also by the fortunate timidity of capital. Builders found it difficult to finance construction on an inflated basis of materials and labor costs. It became evident that the margins protecting a mortgage interest in real estate could not stand up against the deflation in house values that was bound to ensue.

Present Conditions Temporary

"The scarcity of mortgage money retarded the building movement for a time, contributing to the deflation that finally occurred in materials and wages. But capital came back to the building movement when it got re-started on a sounder cost basis. However, like all prices, building materials in some lines reacted too far. Some of them went below fair prices. Profits for the producers were wiped out. The present advance in prices, just as earlier in farm products, is serving to correct this uneconomic condition. It is my belief that the building movement is now based on fundamentally sound conditions.

"It is my forecast that the anomaly of falling rents and home prices with rising materials prices is temporary; that materials prices will not go so far as to block the downward revision of rents and real estate values. If labor, builders or landlords try to jack prices up, stagnation will develop.

"There are still large unsatisfied demands for homes both to rent and buy, but this demand will not seek satisfaction at past or present levels. The housing shortage has been largely answered by a repression of demand that is elastic enough to meet conditions. Demand will remain restricted if prices again become restrictive."

SUGGESTED METHODS OF REDUCING COAL CONSUMPTION

"BUILDINGS and Building Management" of September 18, 1922 reports a series of recommendations for reducing coal consumption as suggested by the fuel committee of the Building Managers and Owners Association of New York. These suggestions are reproduced in view of the fact that they may prove of interest to architects' clients who may be owners or lessees of office buildings and other structures where the reduction of coal consumption will be mandatory this winter. The regulations are thus quoted:

"*Office Buildings.*—1. No heat, light, power or elevator service shall be furnished from 7 p.m. to 6 a.m. or on Sundays or on legal or state holidays.

2. No live steam is to be used for hot water heating from May 1 to October 1, excepting for the purpose of cleaning the building.

3. Cut down elevator service at least 25 per cent from maximum during business hours.

4. Cut down all electric lighting in offices, hallways, etc., at least 25 per cent from maximum.

5. No heat shall be furnished from May 1 to October 1.

6. Shut off all radiators near open windows.

"*Lofts and Mercantile Buildings.*—1. In stores, lofts and mercantile buildings, no live steam for heating or for commercial purposes shall be used between the hours of 6.30 p.m. and 6.30 a.m.

2. No live steam shall be used for heating or commercial purposes on Sundays or holidays.

3. No heat shall be furnished from May 1 to October 1.

4. Cut down the use of commercial steam by shutting off the valves to apparatus that is not in use.

5. Throw off all belts of machinery not in use.

6. Cut down all electric lighting at least 25 per cent from maximum.

"*Apartments and Dwellings.*—1. Discontinue all use of live steam for vacuum cleaners, laundry driers and tubs.

2. All outside lighting to be discontinued except lights necessary for public safety.

3. Temperature of hot water at tank shall not exceed 150° F.

4. Cut down all electric lighting in apartments and hallways, etc., at least 25 per cent from maximum.

5. Cut off the supply of heat at source between the hours of 10 p.m. and 6 a.m.

6. No heat shall be furnished from May 1 to October 1, and then only if outside temperature is below 50° F.

7. Radiators near open windows must be shut off.

"*General.*—1. Do not have the temperature in any space above 68° F.

2. Shut off all lights in sunlighted areas and in show windows during daylight hours.

3. Whenever possible, regulate heating systems so that no steam will escape through exhaust headers.

"*Modification of These Regulations.*—The recommendations concerning heating to apply to all classes of buildings when the thermometer is 10° above zero outside. When the temperature is lower, sufficient heat may be provided for the protection of pipes.

Fuel Conservation in Power Plant

1. Weigh the coal and record the amount of coal used on each watch or shift.

2. Measure the feed water and see that it is properly heated.

3. Make provision for the correct supply of air to the fuel and see that the draft is properly controlled.

4. Keep boiler surface clean on the inside and outside and see that the boiler is regularly blown out.

5. Keep the grates in good repair and see that the settings and breechings and access doors are kept free from air leakage and that the boiler surfaces, which waste heat, be covered with proper insulation.

6. That the surfaces of the steam piping, the drums and feed water heaters are properly covered with insulated material to prevent any loss by radiation.

7. Stop all steam leaks and keep the steam traps in good repair to prevent steam blowing through.

8. Utilize exhaust steam wherever possible to the exclusion of direct steam from the boilers.

9. Trap all clean returns back to your feed water tank.

10. Place a competent man in your plant to be detailed for the work of fuel conservation in both the boiler and the engine room.

Steam Grades of Anthracite in Heating Furnaces

1. No. 1 buckwheat, and even small sizes of anthracite coal, can be burned in the ordinary furnace with shaking and dumping grates, if a bed of ashes is allowed to accumulate under the coal, providing there is sufficient draft.

2. The average furnace, for at least 60 per cent of the time, operates below its capacity and during such times steam sizes of coal will supply the necessary amount of heat.

3. The smaller sizes of anthracite can be used at night to bank fires and on warm days, thus saving the larger sizes for use in severe cold weather.

4. At night, after the fire is shaken down and some of the larger coal put on, the fire can be banked for the night by shoveling on a top dressing of No. 1 buckwheat.

5. In the morning, the furnace should be shaken down as usual and fired with some of the large coal.

6. In mild weather, after the fire has begun to burn well, it can be checked or banked by using a quantity of buckwheat as a top dressing.

7. The two sizes of coal should never be mixed, but kept in separate bins. The buckwheat should be used only as a top dressing.

Mixture of Steam Grades of Anthracite with Semi-Bituminous in Steam Plants

1. If the furnace equipment is designed for pea coal or larger sizes of anthracite, steam sizes of anthracite may be used by mixing a small amount of semi-bituminous coal with No. 1 buckwheat or smaller to act as a binder to hold the fire on the grates, and also to increase the calorific value. The amount necessary to bind the fuel varies from 5 to 10 per cent. This mixture can be burned without smoke. Smaller sizes of anthracite may require as much as 20 per cent of semi-bituminous.

2. It is often advisable, when untrained firemen are handling these mixtures, to have a small pile of semi-bituminous on the boiler room floor where the men can get it to fill holes or thin spots that may develop in the fire.

3. Proper mixing is most essential. It may be done either by delivering in wheel-barrow alternate and pre-determined portions of the two kinds of coal, and then mixing by not less than two turn overs with a shovel before dumping in front of the furnace; or on a larger scale by a similar delivery of carload lots to the coal tipple.

SAFE CHIMNEY CONSTRUCTION

FROM the *Heating and Ventilating Magazine* for September, 1922, we quote these paragraphs:

"According to the Actuarial Bureau of the National Board of Fire Underwriters, defective chimneys and flues are responsible for more property losses than any other of the four divisions into which heating plants are divided in the list of fire causes. Defective chimneys and flues stand third in the list of major fire causes, the list being led by electricity and matches-smoking.

Cause of Chimney Fires

The reasons why chimneys are such a fruitful source of fire have been thus summed up:

1. Use of terra cotta sewer-pipe or other unprotected tile or hollow blocks for the chimney;

2. Construction of chimney with bricks laid on edge instead of flat;

3. Chimney walls built with brick flatwise or only one brick thick, and flues unlined;

4. Supporting chimney on the timber construction of a building or upon brackets; or insufficient masonry foundation, when the chimney rests on the ground;

5. Two or more connections to the same flue;

6. Building woodwork into the wall of a chimney, or placing it in contact with its exterior;

7. Smoke-pipes arranged to enter a chimney in vertical line;

8. Carelessness in sealing connection between smoke-pipe and the chimney, and failure to anchor the pipe to the chimney;

9. Carelessness in not renewing a rusted smoke-pipe and also in allowing

combustible material too near the pipe;

10. Carelessness in not keeping the chimney clean and the joints in the brickwork properly pointed.

Recommended Construction

A chimney should always be solidly built upon an independent and indestructible foundation. It should never rest upon wooden construction because this will cause shrinkage and settling, with the result that the chimney is very likely to crack and permit the escape of sparks.

In some parts of the country it is a common practice to suspend a chimney from floor or roof timbers by iron hangers. This is a dangerous custom and should not be permitted.

A chimney wall should never be less than 3¾ inches thick (the width of a standard size brick) and should be lined with chimney tile. This is important, since in the absence of this lining the mortar between the bricks will eventually disintegrate and fall out under the action of heat and the gases of combustion. For these reasons, plaster is not a satisfactory lining as it is sure to crack and fall off in the course of time. Fire clay chimney tile, manufactured for the purpose, is the only safe material and its use adds little to the cost of construction. Excess mortar at the tile joints should be carefully removed so that the flue will present a smooth surface which will create a good draft and keep the accumulation of soot at a minimum.

Building chimneys with bricks set on edge is dangerous as it makes thin, unstable construction that soon causes the cracking of the mortar and the development of crevices between the bricks. It is considered imperative that the bricks should be laid flatwise. The practice of building woodwork into a chimney wall should never be permitted, nor should it touch the chimney, a separation of approximately 2 inches being necessary for safety. This applies to all floor construction, partitions, rafters, roof boards and shingles.

Where a chimney passes through a floor, the space between the floor timbers and the chimney should be filled with some porous, incombustible material, such as cinders, refuse plaster or mortar, held in place by a sheet of metal nailed to the underside of the wooden beams. Neither solid mortar nor brickwork should be used to fill the space, since they will transmit heat. Gypsum blocks sawed to fit the space constitute one of the best materials for this purpose. At the roofline sheet metal flashing, set into the joints of the brickwork and overlapping the roof boards, should be used.

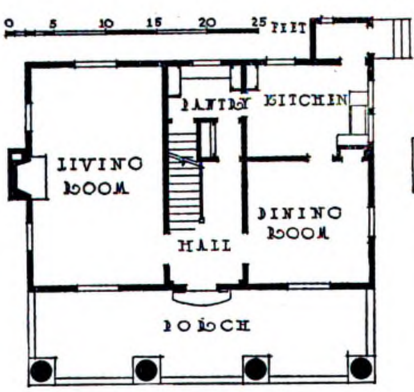
It may be mentioned that filling the space between the chimney and the woodwork has two important results. In the first place it prevents a fire, originating on a lower floor, from passing up behind a partition or furring into upper stories or the attic, and also avoids the possibility of rats or mice building nests in these spaces and thus filling them with highly combustible material, which in time may be ignited from heat transmitted through the chimney wall. Woodwork frequently catches fire in this way.

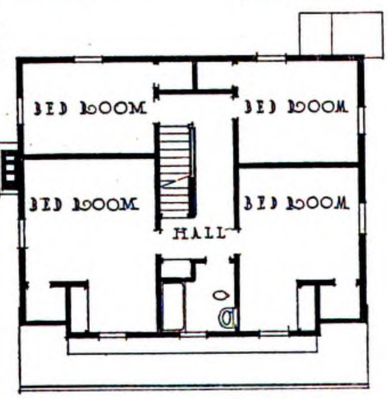
It is stated in the model ordinance that a round flue will give a better draft than a square or rectangular shape having the same cross-sectional area, and it advocates using the round kind when practicable. When such flues are placed inside rectangular chimney walls, however, care must be exercised to fill completely the corner spaces. Otherwise there is likely to be a leakage of air which would detract from the draft, and also increase the fire hazard.

Method of Testing Chimney

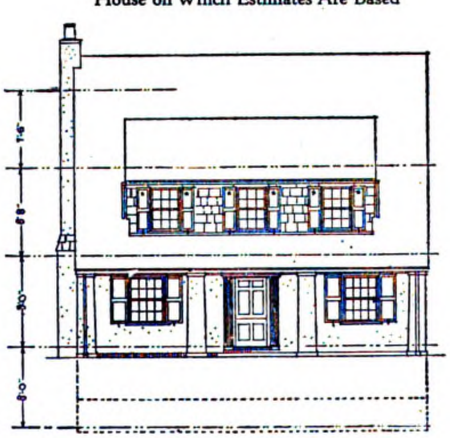
It is advised that chimneys, both new and old, be tested by building a smudge fire at the bottom of the flue, and while the smoke is flowing freely, closing the flue at the top. The escape of smoke into other flues or through the chimney walls will indicate openings that should be closed up.

Monthly Estimates on Typical Small House





Floor Plans and Elevation of Typical House on Which Estimates Are Based



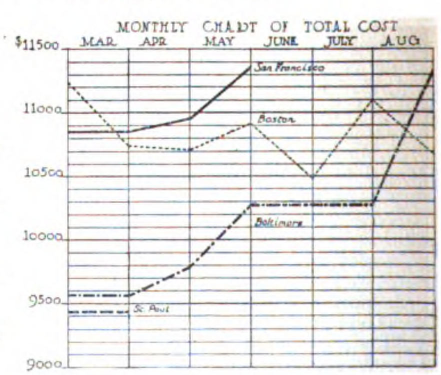
WE have submitted working drawings of this house, together with a quantity survey of materials, to a representative contractor in each of the cities named, and have secured bona fide estimates which are tabulated below. Specifications are in accord with good practice in the several localities as found in houses of this size built under the supervision of architects. The figures are for the cost complete, including contractor's overhead and 10 per cent profit, but excluding architect's fee.

The cubage of the building is figured from the first floor area exclusive of porches and a height measured from 6 ins. below cellar floor to half point of gable, to which is added cubage of kitchen entry and half the cubage of porch, taking height from footings to plate of dormer.

COST OF HOUSE (Cubage, 27,150 ft.)

Total and cubic foot costs for four months in two Eastern cities:

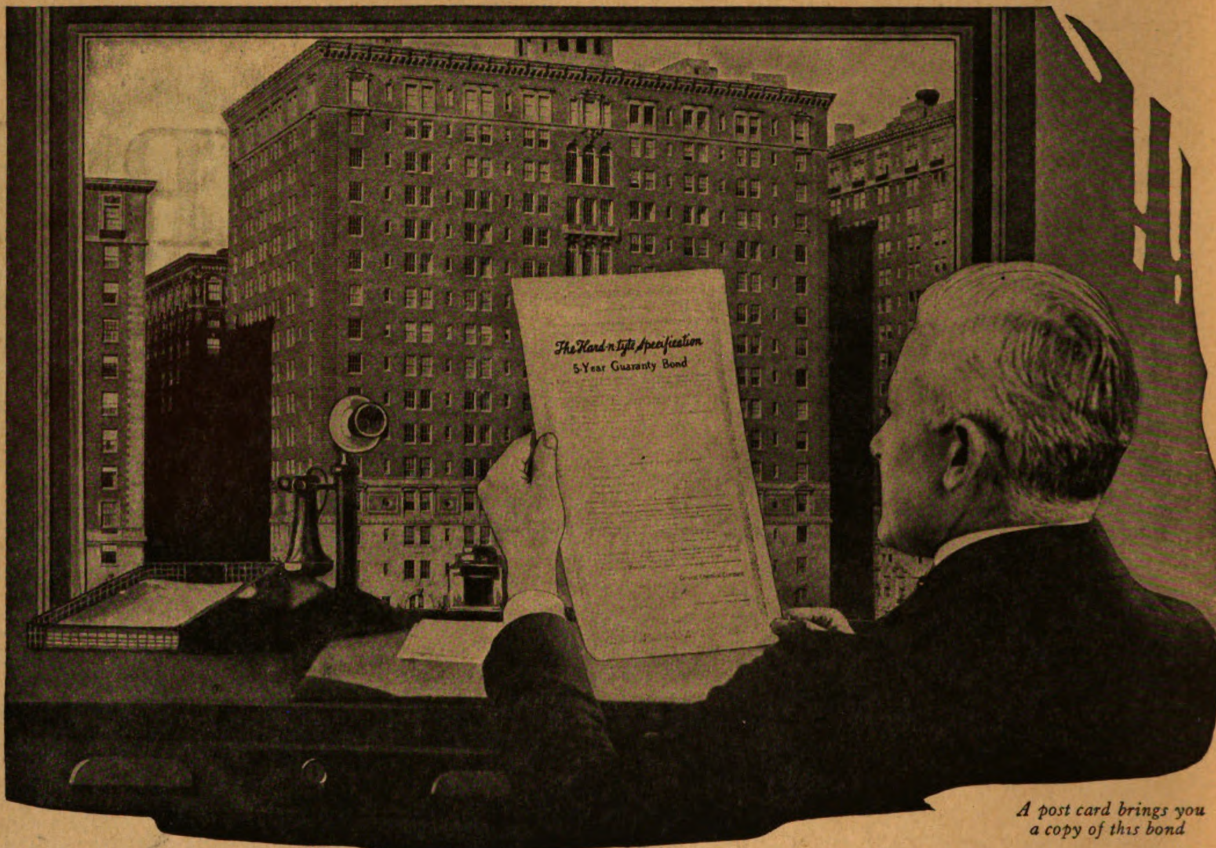
	Baltimore	Boston
June	$10,272.50	$10,906.50
	.378	.401
July	10,272.50	10,480.91
	.378	.386
Aug.	10,272.50	11,106.76
	.378	.409
Sept.	11,329.70	10,677.85
	.417	.393



THE ARCHITECTURAL FORUM

NOVEMBER

1922



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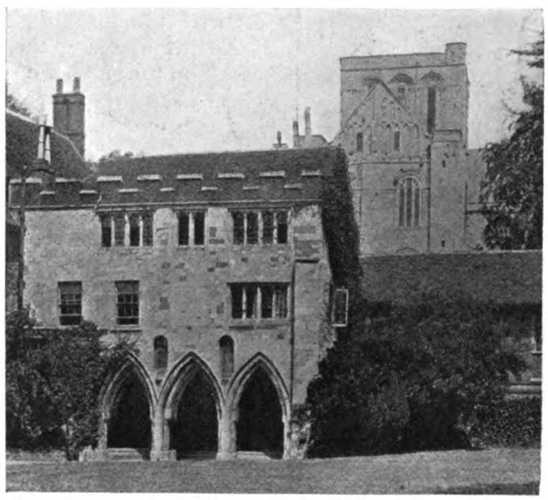
BOOK DEPARTMENT

A GUIDE TO ENGLISH GOTHIC ARCHITECTURE. By S. Gardner. 56 drawings in the text and 180 photographs. 6 x 10 ins. Price $5.25. The Macmillan Co., New York.

THE genius of the centuries of the later middle ages, from the eleventh to the fourteenth, worked the development of a different form of Gothic architecture for each country into which the use of Gothic forms had been carried. Even within the borders of a single land there might be many and subtle variations of design and mannerisms of construction, uses emanating from the chief cities of different provinces. France saw the development of many such schools, the Gothic of the Ile de France differing considerably from that of Burgundy, Anjou or Champagne, even during the period when Gothic architecture was at its height and when builders were diffusing the knowledge and making common property the achievements which experience had given them.

Different by far from the history of Gothic in France is its story in England. The conquest of England by the Normans, toward the end of the eleventh century, brought into England the manner of building which even then prevailed in Normandy, developed by that hardy race which had invaded northern France as barbarians, the destroyers of churches, murderers of priests and the ravagers of convents, but which within one brief century had not only embraced Christianity and the arts of peace but had absorbed the architectural knowledge of the conquered territory and were building in many parts of Europe the beautiful forms which we know as Norman. The same builders were to carry to England the Gothic architecture of France, and Normandy sent across the channel the best of her sons to be master craftsmen as well as bishops and nobles.



The Deanery, Winchester
From "A Guide to English Gothic Architecture"

In this work there are contained illustrations and descriptions of many of the religious structures built in England which stand as examples of the architecture of the late Norman and Gothic periods. The use of transitional forms and of the early English, decorated and perpendicular Gothic types, is made clear and definite and aids the student in gathering a clear idea of the history of this great movement which was destined to cover all Europe with a white mantle of churches. Because the building of its Gothic forms is so clearly the reflection of the temperament of a race it is important that the student recognize the points of divergence between the plans of the great cathedrals of France—Paris, Rheims, Chartres and Amiens—and the great structures which mark the culmination of English Gothic — the substitution for the apse and the *chevet*, made up of its encircling ambulatory and radiating chapels, of the square end with its great window which filled the entire east end of the sanctuary, and differences of design, such as the tendency of the French to use vast window spaces, thus diminishing the proportion of solid wall which was

more customary in England. Then, too, the English cathedrals were situated differently from those of France, and were almost invariably built where much surrounding area gives opportunity for the emphasis of its architectural dignity; almost always the spacious area of close and other domain sets the cathedral apart from its town, as at Salisbury or Litchfield, or else its towers may dominate a height, as at Durham, in any case securing an opportunity for expression which could never be had by a French cathedral, intimate part and parcel of a town's life and so closely built around with domestic structures, as at Amiens or Rheims, that it is often impossible to secure an adequate view of the cathedral itself.

The method in which the work is arranged adapts it to the student's use, for it is planned according to subjects with the illustrations placed in chronological order. These illustrations include general interiors, spires, towers, porches, windows and doors, and numerous details of sculpture, such as capitals, foliage, bosses, corbels and figure subjects of different kinds.

Notwithstanding the number of works being published on the subject of Gothic it is not always easy for the student to obtain a really firm grasp upon its meaning, and particularly welcome is a work which renders more easily understood the theory and practice of architecture's supreme achievement.

HET MODERNE LANDHUIS IN NEDERLAND. By J. H. W. Leliman and K. Sluyterman. 236 pp., 8½ x 11½ ins., bound in cloth. Martinus Nijhoff, The Hague, Holland.

THE modern suburban or country house in Holland has undergone the transformation which has attended its development in every country, and this well printed and fully illustrated volume sets forth the result. With the well defined traditional domestic architecture of Holland as a foundation, the modern Dutch architects have evidently not been slow to adapt to their problems whatever in the architecture of other countries fitted in with their needs, and many of these well designed homes suggest that Holland as well as America has felt the influence of what is sometimes known as the "modern English" style, while certain others might almost have been photographed in the suburbs of Boston or New York.

An interesting characteristic of the greater number of these houses, almost all in country or suburbs, is the prevalence of brick as a building material, to be expected no doubt in a country where forests are but rare while brick has been in use for centuries. The illustrations prove that the Dutch have not lost their ancient skill in the use of brick and in its combination in pleasing manner with wood, tiles, stucco and the other materials which are combined with brick in other lands. An interesting detail of many of the illustrations is the use which they show of roofing materials—tile for the most part, though many houses are roofed with what closely resembles old fashioned thatch, which adds that touch of quaintness which Americans are apt to associate with the Netherlands. The floor plans of the various houses which are included show an arrangement not greatly different from what would be found in America, the chief difference being perhaps the apparent tendency toward planning a number of small rooms in the area wherein America but one or two larger rooms would be preferred.

ARCHITECTURAL DRAWING. By Wooster Bard Field, Architect. 9 x 12 ins., 161 pp. Price $4. McGraw-Hill Book Co., Inc., New York.

EVEN the most skilled of draftsmen is apt to consider his knowledge incomplete. The technique of architectural drawing is so large in extent and in many of its phases so complicated in detail that the proper grasping of the subject may well occupy years of study, application and practice. To obtain a good working knowledge of the art many volumes of text and countless expensive plates would be required, since almost without exception these books and portfolios of plates each deal with but a single aspect of the subject and go into that at considerable length, which makes it necessary that the student have access to a well equipped library or else invest in a variety of more or less expensive works.

In this volume, prepared by the Assistant Professor of Engineering Drawing at the Ohio State University, an attempt has been made to provide for the student those things which might be regarded as the fundamentals of the initial stage of the subject, as well as a careful presentation of certain of the more important points which are not generally covered in the work of the schools, but left to be acquired by actual practice after the student has left school. The subjects covered are taken up in the order in which they are naturally presented at the drawing board, which would seem to be a logical and natural method of presenting them, since this sequence would also give the reader a comprehensive and well-ordered grasp of the entire process. First there is an explanation of the method of orthographic projection and its application to architectural drawing; this includes the relation of views, auxiliary projections, sections, developed views and intersections. Next in order there is a description of the instruments commonly used in drawing and consideration of the geometric solutions most employed by architects. The subjects of preliminary sketches, scale and detail drawing and the orders of architecture are then taken up. While upon the subject of scale drawings examples are given of typical drawings which show buildings of different materials and various methods of construction to present to the student the methods by which certain well known architects actually portray such buildings, knowledge of which is of value to draftsmen.

As a guide to the student a suggested course of study has been added, presented in view of the author's wide experience as a professor of engineering drawing. This course is made up in such a way as to serve as an outline for either a simple or a comprehensive program of study, and it gives the student a methodical order of procedure while making it optional with him as to the extent of his work in each of the departments concerned. The work deals primarily with architectural drawing, but suggestions are made for wider study in both architectural design and engineering. For most students an important subject during earlier days is lettering as applied to architectural work, and this subject has been treated at some length by Prof. Thomas E. French, also of the Ohio State University.

A work of this kind would be quite naturally intended primarily for the use of students of architecture, but it will be found invaluable as well to anyone concerned in any way with architectural work.

THE ARCHITECTURAL FORUM

VOLUME XXXVII NUMBER 5

CONTENTS for NOVEMBER 1922

PLATE ILLUSTRATIONS

LETTERPRESS

ALBERT J. MacDONALD, Editor

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THE EDITOR'S FORUM

PHILADELPHIA EXPOSITION

ON recommendation of the Engineers' Club of Philadelphia and the Philadelphia Chapter of the A. I. A., Paul Philippe Cret and E. B. Temple have been designated as architect and engineer, respectively, to take charge of the preliminary planning of the exhibition to be held in Philadelphia in 1926 in celebration of the 150th anniversary of the signing of the Declaration of Independence. In explaining the action of the Committee on Grounds and Buildings, headed by General Atterbury of the Pennsylvania Railroad, Colonel Franklin D'Olier, President of the Sesqui-Centennial Exhibition Association, said: "The purpose of this move is to work out a tentative plan of grounds and buildings on the Parkway-Fairmount Park site. Mr. Temple, in consultation with the Engineers' Committee, and Dr. Cret, in consultation with the Architects' Committee, and also with the approval of our association, will select their associate engineers and architects. They will form a small, compact, rapidly-working group of engineers and architects who will submit this plan at the earliest possible moment. Dr. Cret and Mr. Temple have volunteered their services as a matter of civic pride, and will act without compensation for this preliminary work."

HOSPITAL COMPETITION

AN interesting competition, open to architects and hospital superintendents, for the design of a small general hospital has recently been announced by *The Modern Hospital*, a monthly publication devoted to the interests of the hospital field.

Richard E. Schmidt, of the firm of Richard E. Schmidt, Garden & Martin, will act as professional adviser. The drawings will be judged by a jury consisting of two architects, two hospital superintendents and a graduate nurse, who has had experience as the superintendent of a small general hospital. Three cash prizes and two honorable mentions will be awarded, the prizes being first, $500; second, $300; third, $200. The drawings required comprise a perspective, two elevations and section, floor plans and plot plan arranged on three sheets.

Those intending to submit drawings are requested to register their names with *The Modern Hospital*, 22 East Ontario street, Chicago, and to apply for a detailed program. The final date for registration has been advanced to December 15, and the date for submitting designs to February 1, 1923.

ONE FORM OF PUBLIC SERVICE

THE value of carefully designed and well planned houses in establishing the character of a community is so universally acknowledged that it might seem to be unnecessary to dwell upon it. But the fact remains that only too often a prospective builder seeks to economize by leaving the planning of the house to a contractor who may have an "architectural department" of some kind, or else a plan is selected from a book of published designs which may or may not be of the character which would enhance the attractiveness of the locality in which the house is to be built. Everything is done, in fact, save the adoption of the obviously correct course and securing an architect to design the best house which architectural skill can provide.

It has often seemed that much might be accomplished were real estate boards or public organizations to interest themselves definitely in the improvement of building design. The raising of public standards and consequently of public values is in one way or another the *raison d'etre* of most public bodies, and what is more effectual in raising values than good architecture?

The Chamber of Commerce of Berkeley, California, has undertaken just this work by arranging for an advisory home building committee to which prospective home owners may come for suggestions. A small library of books and periodicals is to be formed for reference and supplying ideas, and names and addresses of local architects are given those who desire them. Considerable educational work must be done to improve the general standard of good taste and to bring the public to a proper valuation of good architecture, which of all the arts possesses the broadest appeal by coming most closely to the daily lives of the people.

THE MATTER OF SUB-CONTRACTS

THE Associated General Contractors of America have observed the tendency of some architects to divide their work into many small contracts and place them directly without the aid of a general contractor. Their Committee on Ethics has been requested to draw up a statement of conditions to discuss with the American Institute of Architects and other professional bodies. There is no desire on the part of architects to assume the duties of the contractor, excepting as they feel warranted by the failure of many general contractors to function according to expectations. A thorough discussion of the difficulty should help in arriving at the definite duties of each group.

LE BRUN TRAVELING SCHOLARSHIP

THE Le Brun Scholarship Committee of the New York Chapter, A. I. A., announces the holding of a competition for the award of this scholarship in 1923. Application and nomination blanks may be had of the secretary of any A. I. A. Chapter or of the Le Brun Scholarship Committee, New York Chapter, A. I. A., 215 West 57th street.

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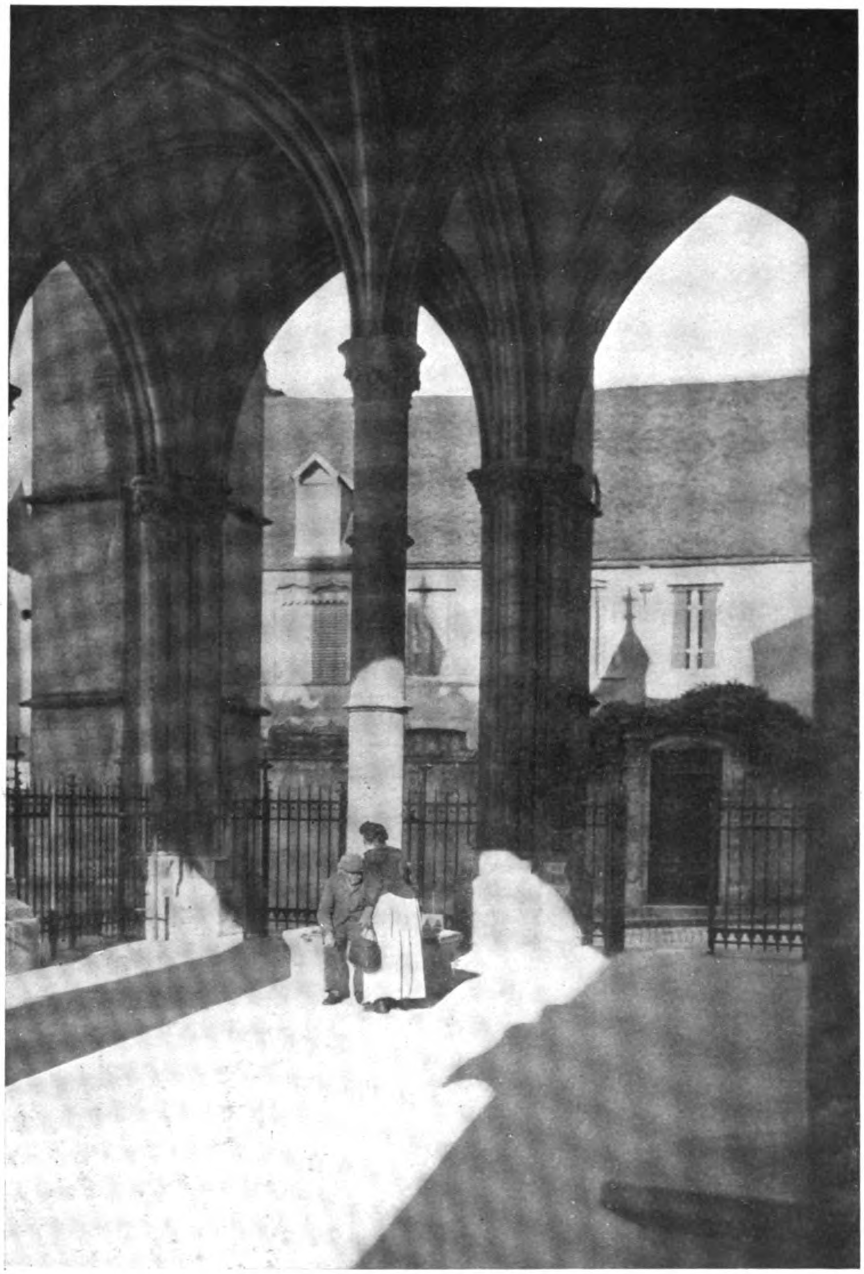

PORCH, NOTRE DAME, BEAUNE, FRANCE
FROM PHOTOGRAPH BY G. DOLBY

The
ARCHITECTURAL
FORUM

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Architects' Vacation Sketches

INTERESTING EXHIBITION OF DRAWINGS BY ARCHITECTS AT BOSTON ARCHITECTURAL CLUB

DURING the latter part of September and the early days of October the great hall of the Boston Architectural Club was used as an exhibition room for a collection of sketches made by members of the club during the rambles and holidays of the past summer. The sole condition under which contributions to the exhibition were received was that the drawings were made during the vacations of this present year. The terms "sketches" or "drawings" were somewhat broadly interpreted, for some of the exhibits were drawings in pencil, crayon, charcoal, or pen and ink; a number were etchings or lithographs, while water colors were the medium in which a majority of the exhibits were made. The exhibition started with but two entries, but increased in scope day by day as new contributors brought in their work and installed it in place or as other contributors enlarged the number of their entries. Some of the exhibits had the added dignity of frames, while others were simply arranged on cardboard mounts. The informal manner of presenting the sketches rather added to their interest, when they were hung upon the long wall spaces of the great hall or else placed

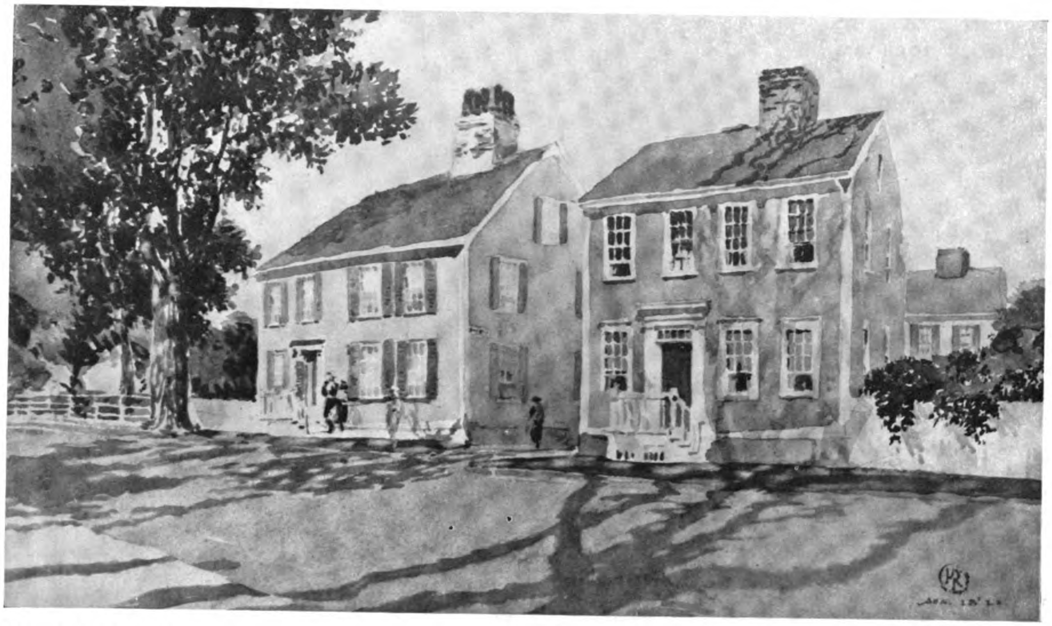
Water Color of an Entrance Doorway
Grand Prize. By F. L. W. Richardson

upon benches when all the available spaces were covered, for the exhibitors were not professional painters but practical architects, who for the love of it had tried their hands at making pictures.

Of course there is a vast difference between the drawing which forms a large share of an architect's professional work and the drawing which is included in an exhibition such as this,—drawing which is practiced for the most part during the early days of one's career, or perhaps during foreign travels or while sojourning abroad. What generally follows as part of an architect's daily work is drawing of a much more technical and architectural character, more exact, necessarily drawn to a precise scale and so hedged about with restrictions of a practical or utilitarian nature that it is apt to lack the joyous freedom of movement, the spontaneity of feeling and the delicacy of touch which contribute so largely to the charm of sketches,—a charm which is necessarily absent in the usual drawing of an elevation. An architect's sketch is apt to be rather dry to a painter, who rebels at the restraint of rigidity of lines which necessity compels in most architectural drawing, and this rigidity is apt to become fixed when one's drawing is wholly of this character. What has been proved here, however, is that the faculty of easily handling drawing of a non-architectural character is by no means lost or always impaired by years of drawing of a more technical nature. Especial interest is found in the fact that these sketches are by architects and not by the younger draftsmen, who have lately been instructed in water color, and the exhibition serves two practical purposes in that it points the way to the younger men and proves to them that although the busy architect has but little opportunity for sketching, he still retains the ability necessary for it.

Water Color, Entrance, Old Mansion at Wiscasset, Maine
Second Prize. By Carroll Bill

In addition to being produced in different mediums the items included in this exhibition were drawings of a wide variety of subjects, in which architectural character by no means predominated. With an architect's well-trained eye for the picturesque which lends itself to the purpose of a sketch there were selected many subjects in which buildings occur, but many were the sketches in which buildings were wholly lacking. Many

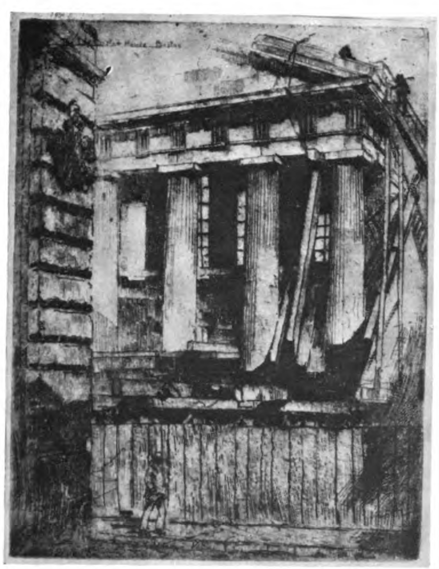


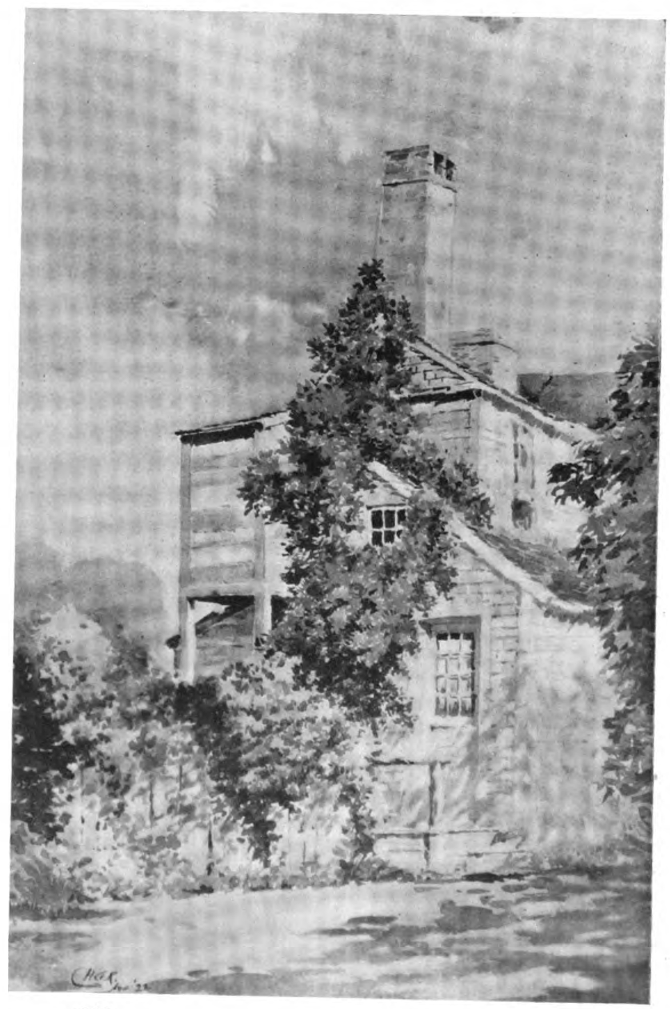
Water Color, Old Houses at Nantucket, Mass.
By Hubert G. Ripley
Mention

VACATION SKETCHES
BY BOSTON ARCHITECTS

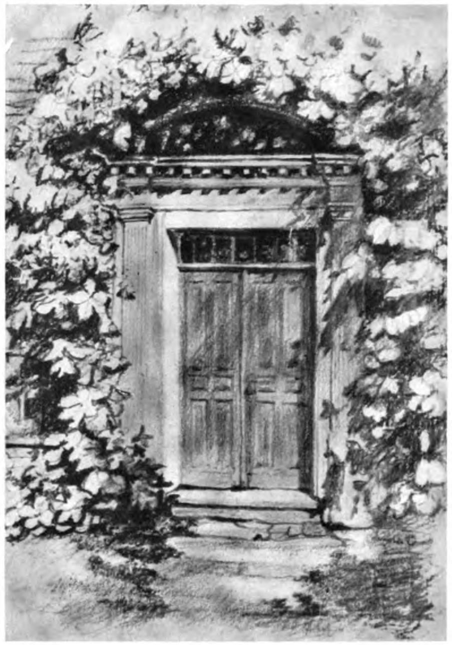
At Right, Water Color, End of Old House at Nantucket, Mass.
By Hubert G. Ripley

Below, Etching, Old Custom House, Boston
By A. H. Hepburn





of the subjects, as might be expected, were chosen from among the quaint byways and forgotten corners which are still many in Boston, notwithstanding all the tearing down and building up which accompanies the march of progress. A. H. Hepburn contributed two delightful etchings, one of the west end of the state house as seen through Mt. Vernon place, and another of the heavy Doric portico of the old custom house. Views of bits not far away formed the subject of Carroll Bill's "An Old Mansion in Wiscasset, Maine," where the most sketchy of drawing was used, the shadows of trees playing across the front of an old white frame house possessing a most charming quality. Several delicate little water colors of bits along the Nantucket coast came from Hubert G. Ripley, one being a village street with a group of two small, prim New England houses with huge stack chimneys, and the other one end of a rambling old frame house overgrown with greenery which climbs the walls and twists itself about a tall brick chimney. Another bit sketched along the Massachusetts coast was the pencil drawing of an old colonial doorway embowered in green, by Oliver P. Morton, and other water colors were a "Boy on a Veranda" by James Clapp, and "Boys by a Brook" by Robert P. Bellows, and an interesting interior of an old dining room by Nelson Chase.



Pencil Drawing by Oliver P. Morton

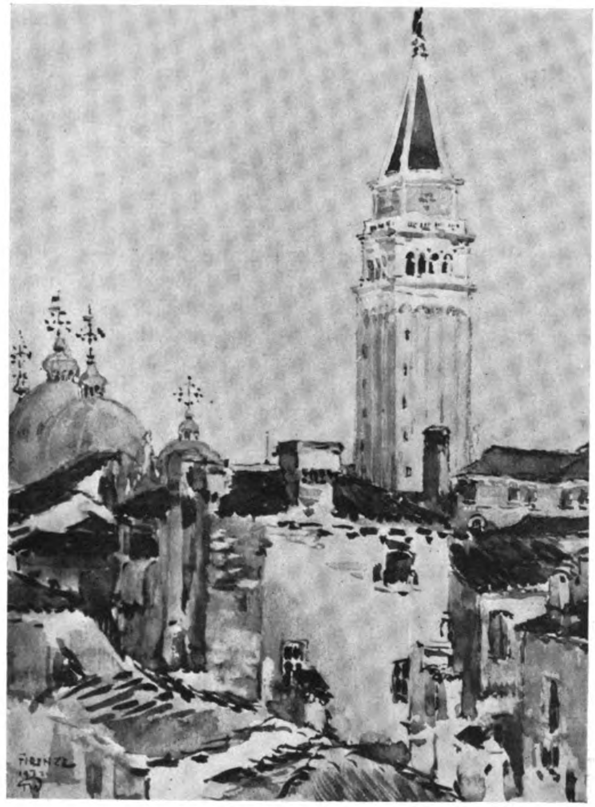
But not all of the exhibits were glimpses of details comparatively near at hand, for one very delightful water color was that by Timothy Walsh showing a view in Venice with the companile and several of the Byzantine domes of St. Mark's, while the water color which received the supreme prize, by F. L. W. Richardson, shows "An Entrance Door" which might have been sketched in Italy or Spain. Evidence of travel in other lands not as far distant as Venice or Spain is presented in a number of sketches by Ralph W. Gray of bits sketched in Bermuda; one is a fine little water view with rising clouds, a sketch which is broad and sure and as simple in its technique as it is admirable in its conception, while another is a study of the gnarled branches of old tamarisk trees, a sketch full of decorative quality. In several instances where a number of items were sent by the same contributor it was interesting to observe that they varied so greatly in color and method as almost to suggest the sketches having

Water Color of an Interior
Second Prize. By Nelson Chase

VACATION SKETCHES

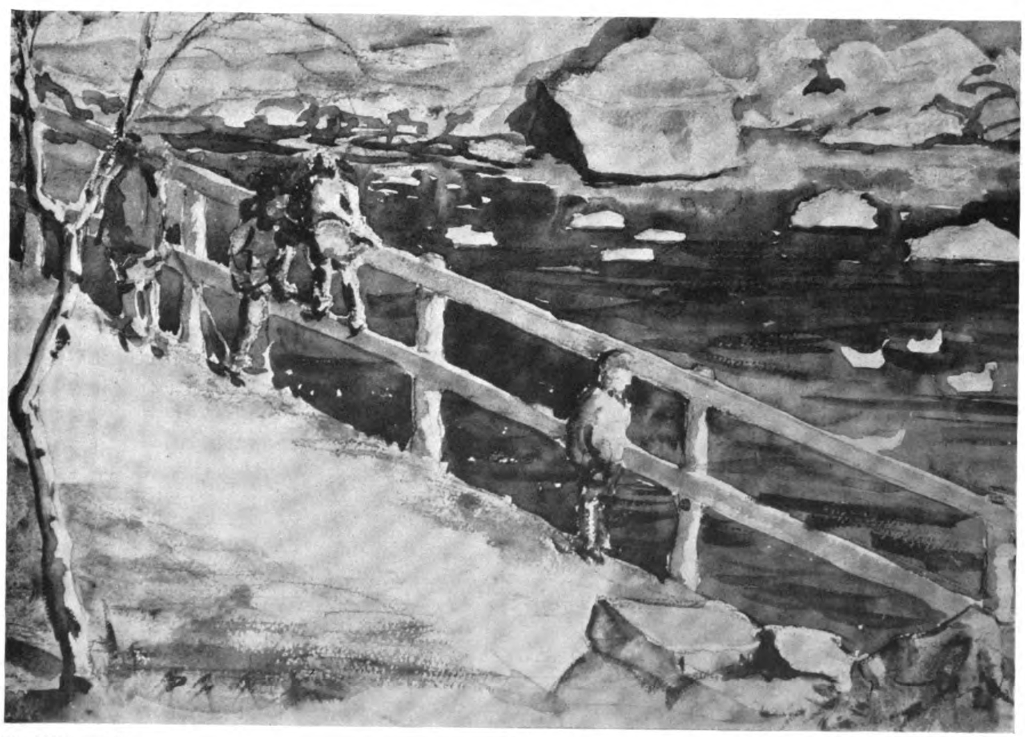
BY BOSTON ARCHITECTS

Water Color, Boy on Veranda
By James Ford Clapp
Mention



Water Color, Campanile, San Marco, Venice
By Timothy Walsh

Water Color, Seaside Pool
By Robert P. Bellows

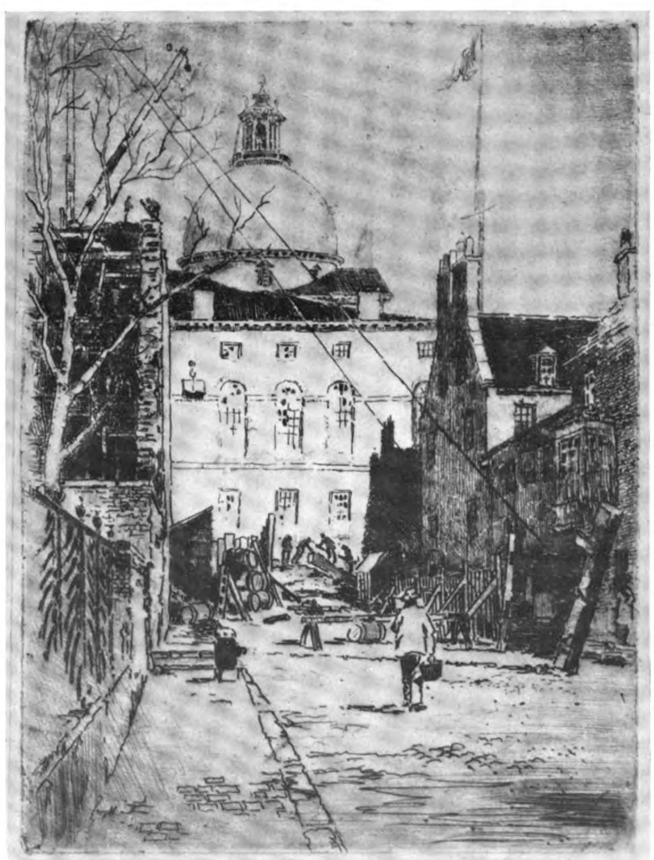


been made by different artists—direct contrasts of technique or the use of mannerisms so widely different that they show the use of several wholly different styles.

Of course as might have been expected with an exhibition so interesting prizes and even mentions were too few to be awarded to all the items well deserving of honors. The rough and tumble-down buildings which fringe the waterfront of Rockport and overhang the water's edge were painted in water colors by Frank A. Bourne; C. L. Pitkin sent a crayon drawing of the Quincy market in Boston, and from Walter H. Kilham came a number of tiny water colors of interesting bits in Boston's west end, where steep grades and unusual layouts of old streets sometimes bring about unexpected dispositions of buildings. From the brush of R. Clipston Sturgis came eight small sketches done in a remarkably brilliant style, showing old roads in and about Portsmouth; J. Lovell Little contributed two sketches of the woods in northern Maine, virile and emphatic in tone and technique, one particularly which showed through a group of gaunt tree trunks in the foreground a view of a distant lake and mountain. The first prize was awarded to F. L. W. Richardson for his water color "An Entrance Door"; second prizes were voted for exhibits in various mediums to Carroll Bill, Nelson Chase, O. R. Freeman, Ralph W. Gray, M. B. Gulick and A. H. Hepburn, while mention was given to W. T. Aldrich, James Ford Clapp and Hubert G. Ripley.

The enthusiasm which this exhibition of vacation sketches aroused among Boston architects, and the interest which it created upon the part of the press and the public in general, might well stimulate the holding of exhibitions of somewhat similar scope in other cities. There is hardly a town or city in America which does not offer interesting material for sketching, and local architects might welcome the pretext which such an exhibition would afford to renew contact with a field of work which may be in danger of being crowded out or forgotten in the daily work of the office.

In England it has for many years been the custom to encourage draftsmen to make sketches and measured drawings of the fine examples of old architecture in which England and the continental countries abound, for it has been found that the draftsmen are benefited by their own attempts and by comparison of their own work with that of others; it has also been found that such sketching tours are of benefit in another way, for intimate contact with fine work brings its own reward in heightened appreciation of detail, mass grouping, composition and other aspects of architectural work which finds expression in actual practice.



Etching, Massachusetts State House from Mt. Vernon Place, Boston

By A. H. Hepburn

First Prize in Black and White Medium

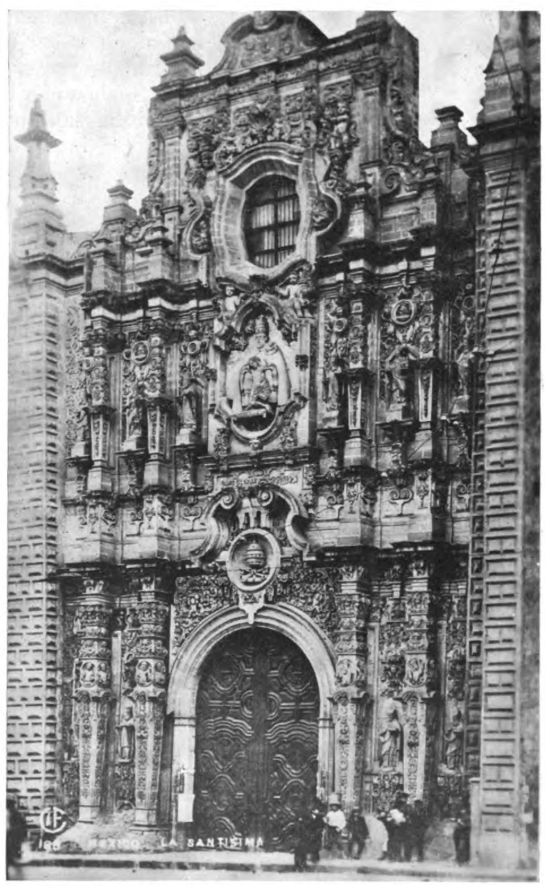
Mexican Renaissance

PART I

By WALTER H. KILHAM

A MODERN geography, in high favor at the present time in public and private schools, disposes of the architecture of Mexico with the statement that "the houses of the people have but one story and are commonly built of sun-dried bricks or adobe held together by layers of mud, the ceilings being made of brush and the floors nothing but earth or stone," qualifying the remark slightly by adding that "this description does not apply to wealthier and educated Mexicans, but even these have adobe houses which somewhat resemble those of southern Spain." When statements of this sort go unchallenged and are officially taught to the rising generation, it is not remarkable that the true story of architecture in that country remains generally unknown to our people.

As a matter of fact, it would be more correct to say that up to about 1820, the date of Mexican independence, Mexico was the only country on the American continent which practiced architecture at all in the real sense of the word, for prior to that time the buildings of the English colonies and the United States were comparatively small in size and slight in construction, with thin walls and wooden roofs, devoid of sculpture or mural decoration, and of a degree of artistic development which entitles them to consideration more for sentimental reasons than for any great merit, while those of the other Spanish settlements are generally of less artistic importance than those of Mexico, though ordinarily of solid and scientific masonry construction. This frugality of architectural output in the English colonies was of course due partly to the over-abundant supply of timber and partly to the scarcity of labor, for the native Indians were few in number and intractable at that; but it was also brought about by the fact that the English and Dutch settlers were not natural builders, as compared with the Latin races. In Mexico, however, these conditions were reversed. Good building stone was plenty, timber was scarce, and the populous native races, once conquered, proved surprisingly amenable to direction, when they were baptized and taken into the fold of the church. With an abundance of labor available the task of building notable and enduring structures was much simplified, but failure might even then have ensued if the directing race had not been endowed with unusual talent for the designing and construction of important buildings.



Portal of La Santísima Trinidad, Mexico City

Of course a highly developed technique was not attainable at the beginning, and the early buildings, rude rather than elegant, sought to satisfy the most urgent needs rather than good taste and perfect convenience; a contemporary writer says of them that "so solidly were they built, one would say they were not houses but fortresses." Nevertheless, such buildings as the palace of Cortez at Cuernavaca or the Casa Alvarado at Coyoacan, both built within a very few years of the conquest (1521), even though the walls are of rather undue thickness and the arches low and squat, are of a far greater degree of sophistication from a constructional standpoint than anything produced in the American colonies before the revolution.

While the bibliography of travel and politics in Mexico is considerable, and much study has been directed toward her prehistoric remains, very little serious work has been done towards presenting a complete story of the Spanish architecture of the viceregal period. Probably

Facade, Casa del Alfeñique, Puebla, Mexico

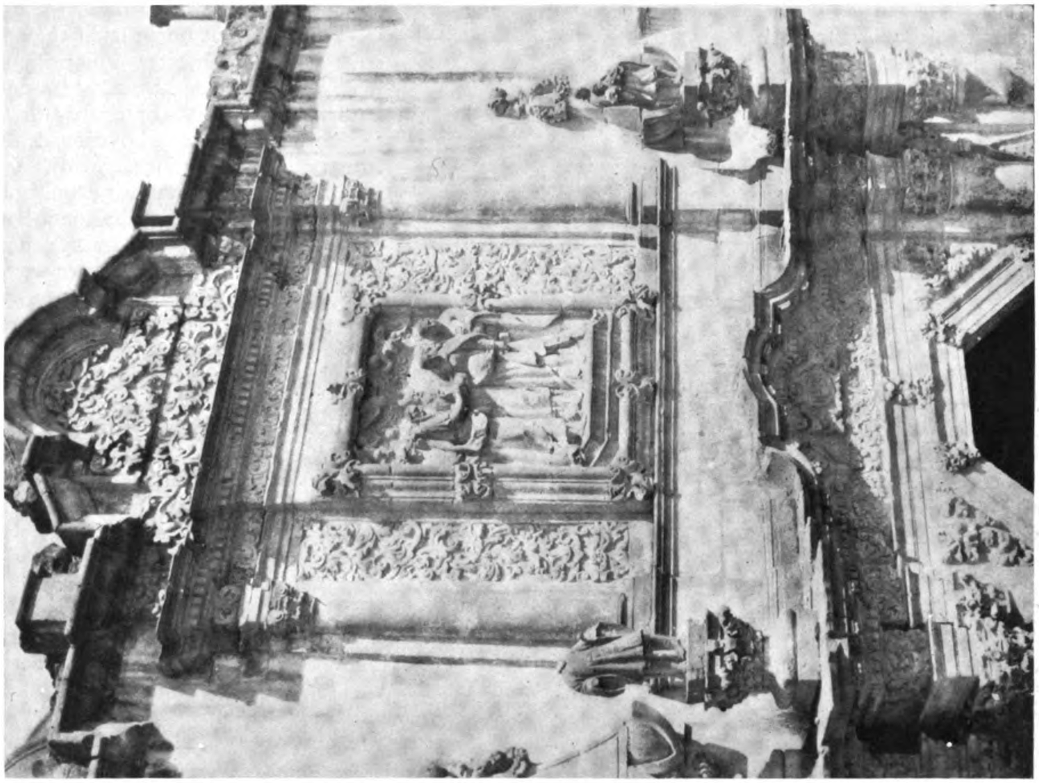
the best book on this subject, although it is all too brief, is the very interesting essay entitled "El Arte en México en la Epoca Antigua y durante el Gobierno Virreinal" by Lic. D. Manuel G. Revilla, published by the Mexican government in 1893. Other handbooks are those on "Arte Colonial" by D. Manuel Romero de Terreros, and the attractive "Monografias Mexicanas de Arte" by Jorge Enciso, Inspector General de Monumentos Artisticos. This author's title is worth noting, together with a passing speculation as to how long it will be before the United States will feel able to support an official of this description. It is interesting to remember also that none of the recent revolutionary governments has interfered with Señor Enciso's work. "The Spanish Colonial Architecture of Mexico," by Sylvester Baxter, is splendidly illustrated by photographs, but the real secrets of the design of this period can only be revealed by drawings, which so far are extremely scarce.

The new colony found it difficult at first to work up to the speed of the prevalent plateresque work in old Spain, which even there must have looked to the conservative hidalgos of the time about as startling as a cubist picture still does to the worthy critics of our own day. The earliest churches of Mexico, such as San Francisco and the Capilla Real at Cholula, either displayed vaults with ribs, reminiscences of late Gothic style in the one, or in the other a sort of replica of the Mosque of Cordoba, with 49 actual domes (*bovedas*) since raised on the original pillars, recalling the still recent Arabic influence in Spain, while the noble interior of San Juan Bautista at Coyoacan is a veritable basilica with its timber framed roof, massive square pillars and deeply worn flagstone floor.

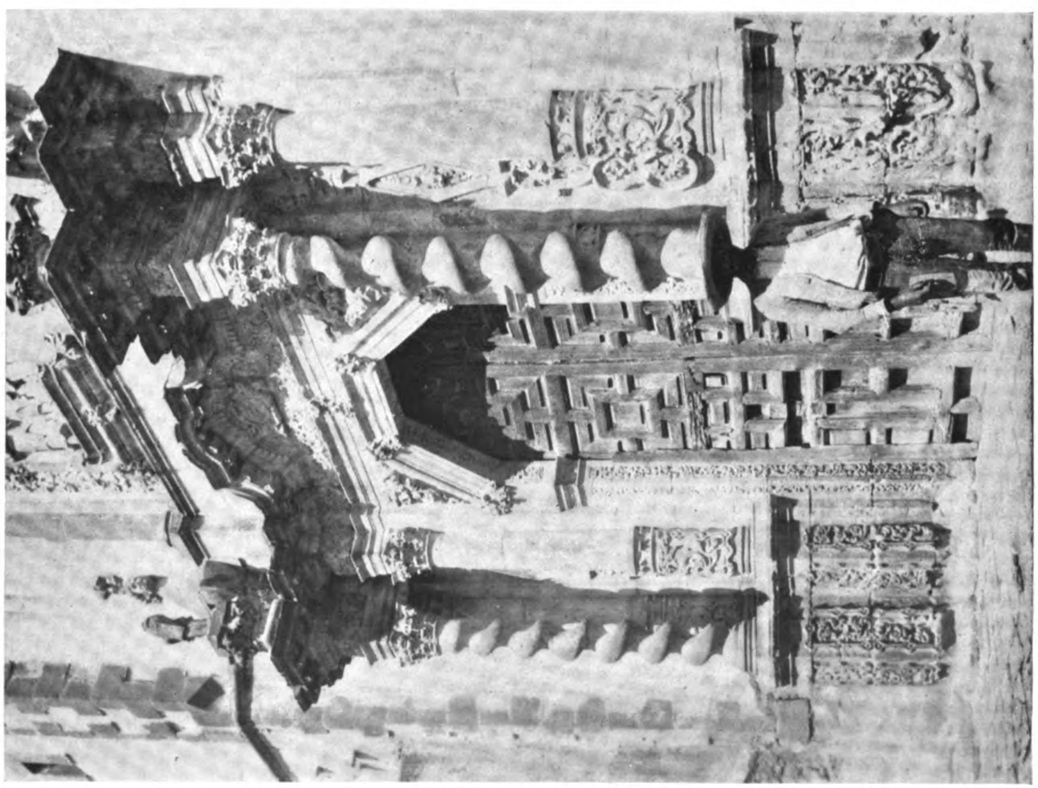
The true renaissance cruciform plan, with a dome or cupola over the intersection of nave and transept, very likely a reminiscence of the *cimborios* of old Spain, however, soon appeared and before the end of the sixteenth century prevailed universally in church design, while on every hand the growing wealth and power of the colony expressed itself in magnificent palaces and handsome public buildings as well as churches. "As builders, after the Romans come the Spaniards" is a saying in Mexico, which seems fairly truthful when one contemplates the extent of building operations carried on during the three centuries of Spanish supremacy. With the advent of the seventeenth century the colonial style swung into the full current of the prevailing *barroco*, with its capricious proportions, heavy and pompous members and broken pediments, a real style nevertheless, and in the hands of the Spaniards one of extraordinary character.

The eighteenth century was the apogee of New Spain. At that period its religious communities, nobility and principal citizens had acquired considerable fortunes. Numerous building projects were undertaken, and older buildings were remodeled in accord with the prevailing taste. The general decadence in Spain under the third Philip was reflected in her provinces, and the arts were not exempt. The *barroco* merged into the Churrigueresque, and the

Detail of Doorway, Casa del Alfeñique



CARVED BAS-RELIEF OVER DOORWAY



DETAIL OF DOORWAY

PORTAL OF CHURCH NEAR S. JUAN TEOTIHUACAN, MEXICO

FROM PHOTOGRAPHS BY WALTER H. KILHAM

two styles mingled so as to be almost indistinguishable. In both the relation of exterior decoration to the actual construction was often disregarded; the *barroco* retained the column as a decoration, though frequently with a twisted or figured shaft, while the Churrigueresque changed it to a pilaster, thicker above than below, and seeming to hang from its cornice rather than to support it. The members are decorated with complicated panels, friezes and garlands, and the pediments writhe in intricate convolutions which baffle the pencil of the sketcher; one is amazed at the imaginative power of the designers. Good examples of this riotous form of design are the two churches of the Sagrario and the Santísima Trinidad in Mexico City. The elaboration and intricacy of these designs are almost inconceivable to an American mind, but at the same time the harmony and proportions of the composition are never lost. In the facade of the Sagrario particularly, the framing of the gray mass of the portals between the plain flanking masses of pink *tezontle* throws the lively sculpture into the high relief characteristic of all Spanish work, whether at home or in the colonies, and emphasizes the brilliant light and shade on the carved stone. But not alone did the Spaniards direct the toiling natives who carved the fronts of these buildings. Motifs and details appear which never came from old Castile, and just as the conquered Arab impressed his taste on the cities of Spain, so did the poor Aztec workman in some mysterious way weave the pathos and genius of his lost race into the facades and towers which the conqueror claimed as his own.

Tower of La Concepcion
Mexico City

One is almost at a loss to choose examples of the baroque influence among the amazing examples of brilliant Mexican work; their number is legion, and I will confine my illustrations to two or three which have never before been published. One is the portal of a little *hacienda* church near Teotihuacan, far from any town or high road, which I happened on by mere chance. The twisted columns on either side of the door carry a coquettishly elaborated entablature topped by carved urns, and the whole supports an upper story consisting of a beautifully carved bas-relief framed by Corinthian columns and decorative side panels. It was interesting to note that the interior of this church, built on the plan of a perfect Greek cross, is entirely carried out in gray stone in a style of Doric chastity perfect enough to excite comment anywhere. San Domingo in Mexico City is another baroque facade of good proportion and elegant detail. The large figure panel above the portal is of particularly good execution.

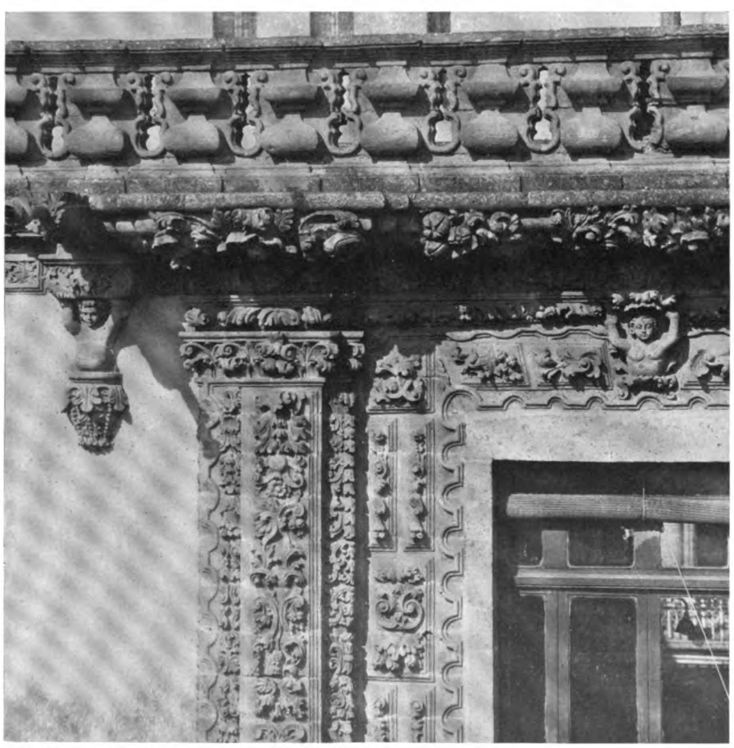


Photo © C. B. Waite, Mexico

Detail of House in Calle Manrique, Mexico City

Another form of the baroque is that which gives to the city of Puebla its distinctive and charming form of domestic architecture of which the well-known Casa del Alfeñique is the best example. Puebla, on the high road from Vera Cruz to the capital, was a great trading center between Mexico and Spain, and very probably due to its constant communication with Seville, the seat of the council of the Indies, its architecture shows a considerable influence of the Arabic or Mudejar style which manifested itself in the use of tiles for the facing of the exterior facades of the houses and in the widely projecting stone

cornices and *antipechos* or balconies, very thin and carved with the most elaborate profusion. Alfeñique is Spanish for "almond cake," and the name means "gingerbread house"; it is nevertheless one of the most beautiful domestic structures in the world. The patio, though small is of the greatest charm with its delicate ironwork, airy open stairway and graceful arches. A house nearby on the same street has a curious cornice in the shape of a succession of wagon tops sheltering a long balcony. The walls of these houses and many others in Puebla are of red unglazed tiles with insets of colored glazed tile in patterns, but the effect, while interesting, is not as striking or as beautiful as that of the famous Casa de los Azulejos in Mexico City, an excellent example.

The quality of the Spanish architecture, however, depends not at all upon its detail. The visitor, lost in a rather puzzled study of the elaborate church and palace facades, often fails at first to note how the enriched surface is always flanked by powerful buttresses of plain stone. The towers, whose bell chambers are always elaborately carved and decorated, never fail to rise from massive and simple bases, and their profiles are always noble, even if sometimes their nobility is tinged with a certain arrogance. The peculiar local method of hanging the bells which swing in the arches lends a characteristic flavor to the weatherbeaten old belfries, though due to the insistent cries for "reform" (how many crimes have been committed in that name!)

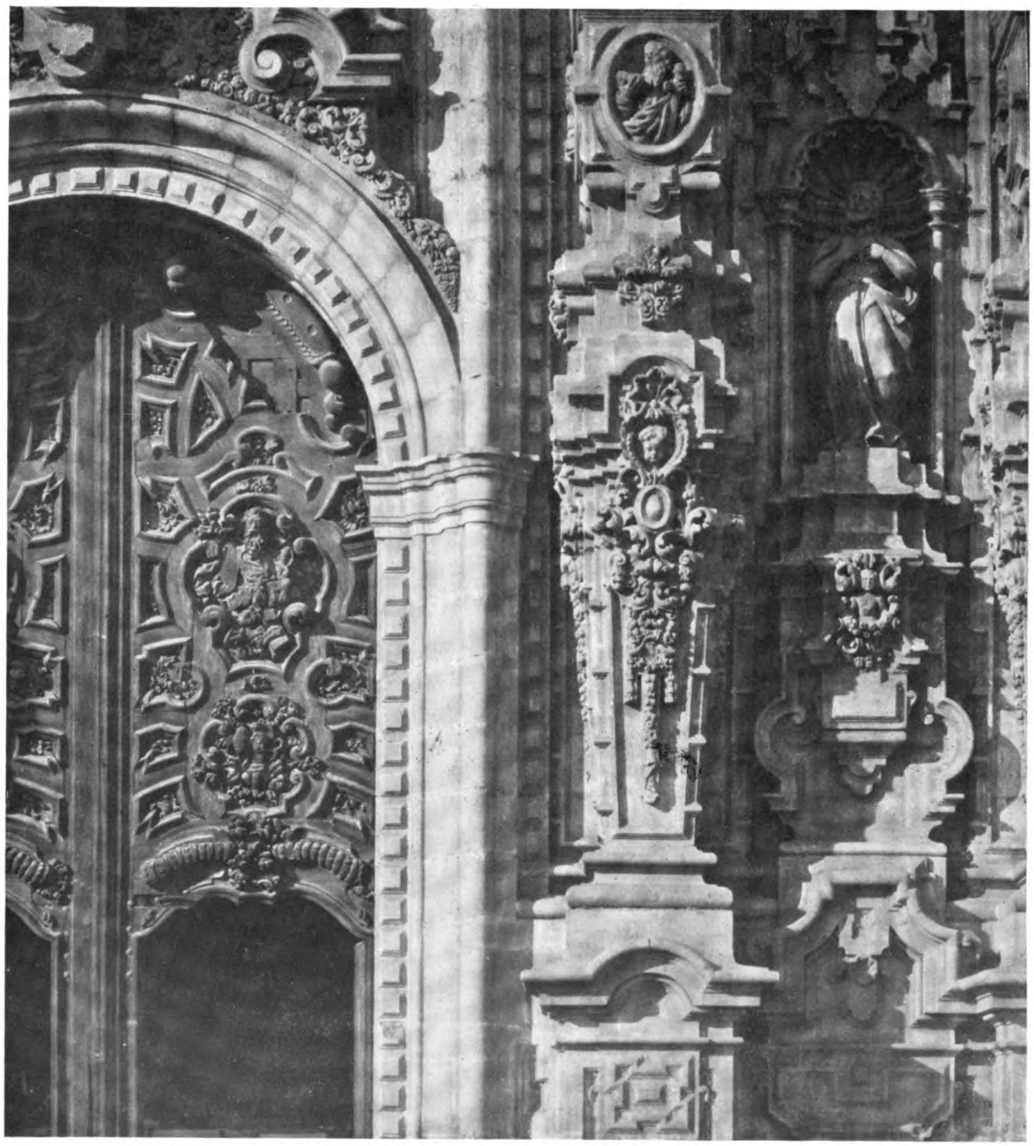


Photo © by C. B. Waite, Mexico

Detail of Stone Carving about Doorway, Church of the Sagrario, Mexico City

the bells of many an ancient church have gone to the melting pot or have even been sold to the Gringos. The photographs show the massive tower of La Concepcion in Mexico City and the Giralda-like shaft of the cathedral at Cuernavaca, but many other pictures would be necessary before the subject could be adequately presented.

The renaissance gave Mexico the dome which, always a striking feature, attains here an extraordinary development, always built of solid masonry, displaying its actual construction, without false inner or outer shell, and as it is employed in great numbers its use imparts a singular sweetness and majesty to the skylines of the cities. So numerous are these domes that one might almost say that the poorest pueblo in Mexico possesses a collection that, built as they are of solid masonry, would create an architectural sensation in New York even, and they were constructed with such facility that many churches possess five or six and, as just said, the Capilla Real at Cholula has actually 49. Some domes rise simply from the crossings above the curved vaults of the roofs, which in Mexico are exposed to the weather, no protective wooden roof being required. Others are raised on drums which may contain windows, which again may be treated with pediments or curved tops breaking into the base of the cupola. The dome itself may be flattened, as in the case of the cathedral at Puebla, or elongated vertically as in the Capilla del Pocito at Guadalupe (see THE ARCHITECTURAL FORUM for March, 1921), or it may be a regular half-orange as is usually the case. It generally carries a lantern (*linternilla*) and in many cases is covered with enameled tiles of blue, red and yellow, laid either in geometrical patterns or forming magnificent and grandiose coats of arms.

By the time the visitor has assimilated the relations of mass and outline to the applied ornament, he begins to discover that what he has been calling renaissance is in many cases not renaissance at all in the European sense of the word. Where in France, Italy or Spain are found such powerful contrasts of the shadows of deep-set window jambs with delicate mouldings? And the profiles of the mouldings themselves—what decision of line, what vigor in the smallest member! Surfaces ordinarily vertical are inclined outwards to catch the high lights,—overhangs are exaggerated to produce sharply ruled horizontal shadows until the whole facade seems to play and sport with the sunbeams like a tossing fountain. Everyone knows that in sparkle and brilliance the early renaissance of other countries is a dull thing compared with that of Spain; the possibilities of the later renaissance should be studied in Mexico. Note for example the carving of the detail of the building in the calle Manrique in Mexico City, once the palace of the Condé de Heras. The crispness and brilliance of the carving is beyond criticism. The play of the scrolls of the arabesques, the serpent-like ornament between the posts of the balustrade, and the masks at the top of the corner ornament are certainly as pre-Spanish as any ornament can be, while the relief of the ornament is heavier than that of the usual renaissance. The spirit of the detail is Aztec, the effect renaissance.

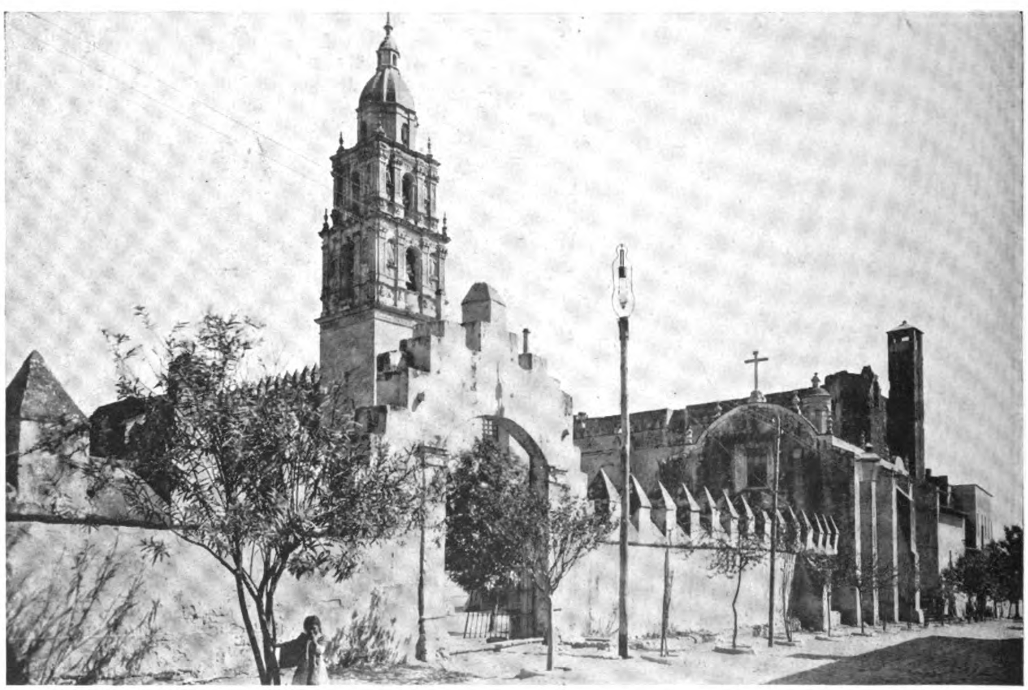


Photo © by C. B. Waite, Mexico

Cathedral at Cuernavaca, Mexico

Photographs by Mattie Edwards Hewitt

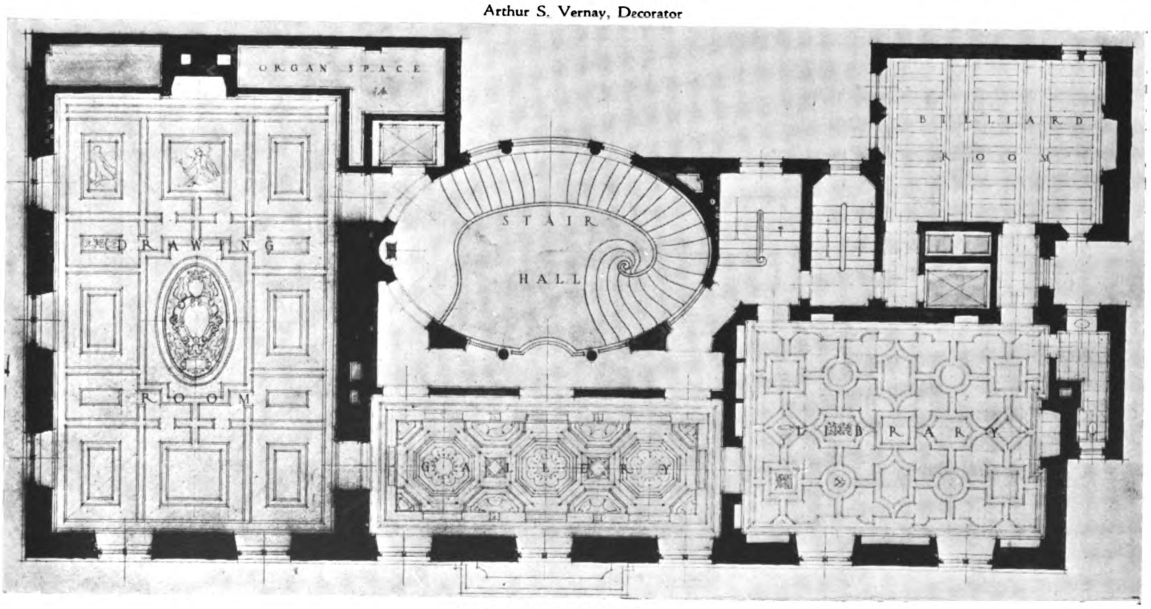
DETAIL OF ENTRANCE

HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT

LOUIS XVI RECEPTION ROOM

Arthur S. Vernay, Decorator



SECOND FLOOR PLAN

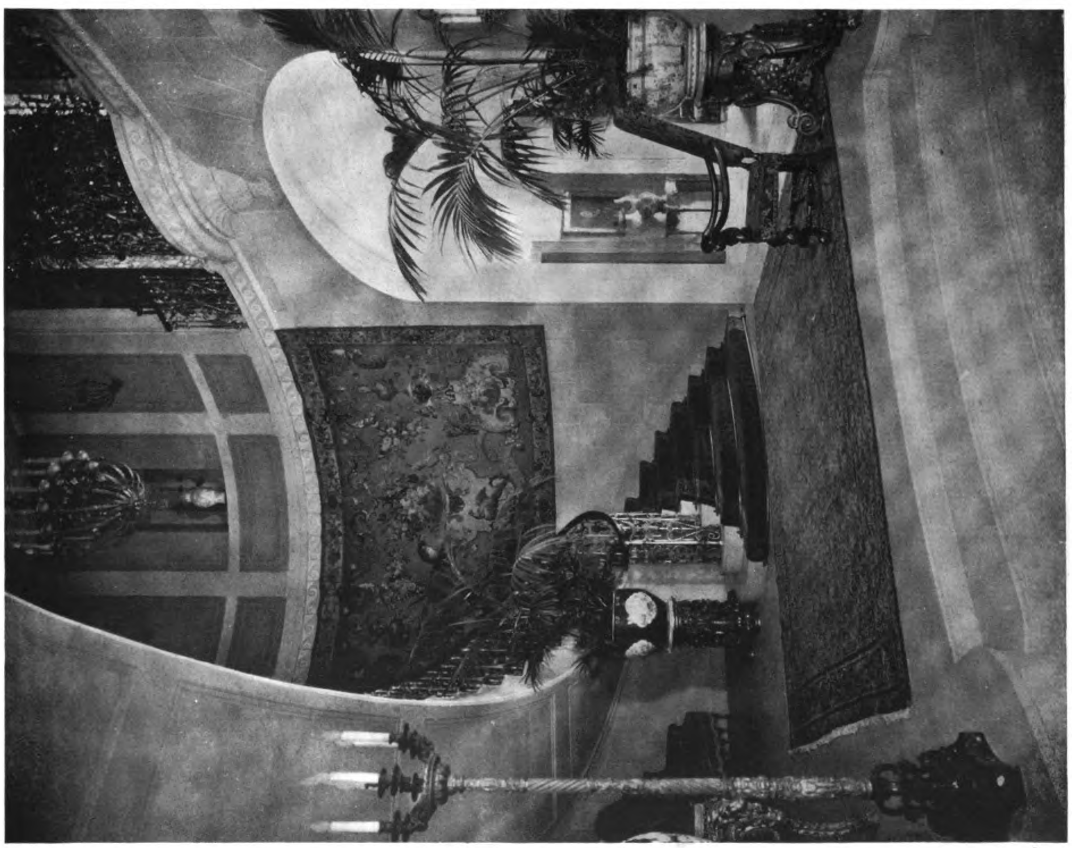
HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT

STAIR HALL

HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT



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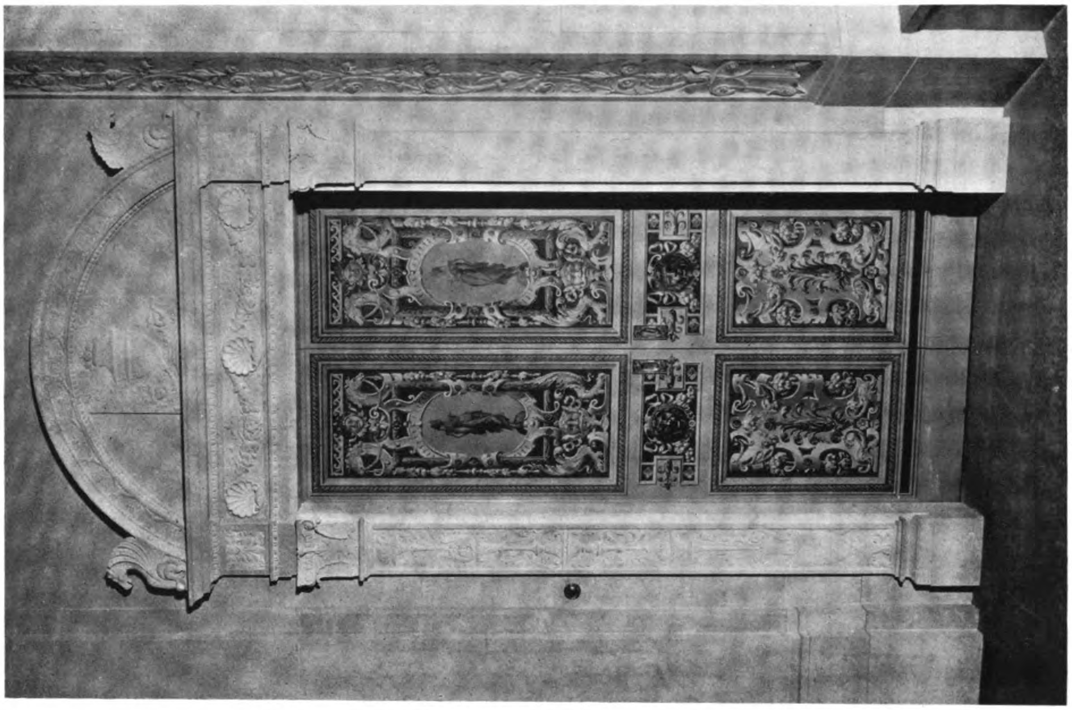
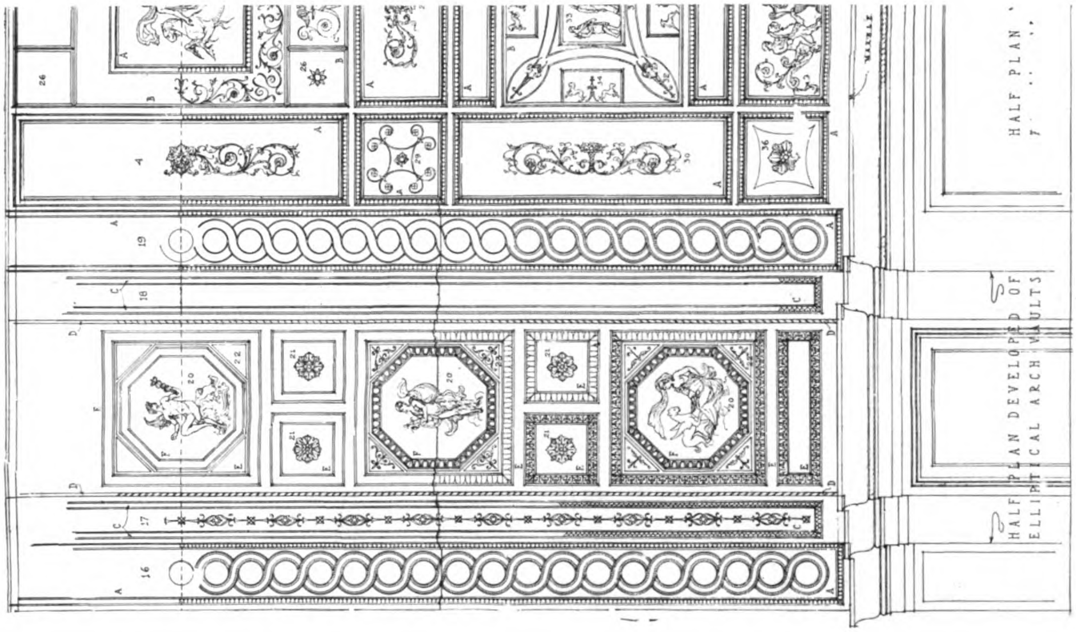


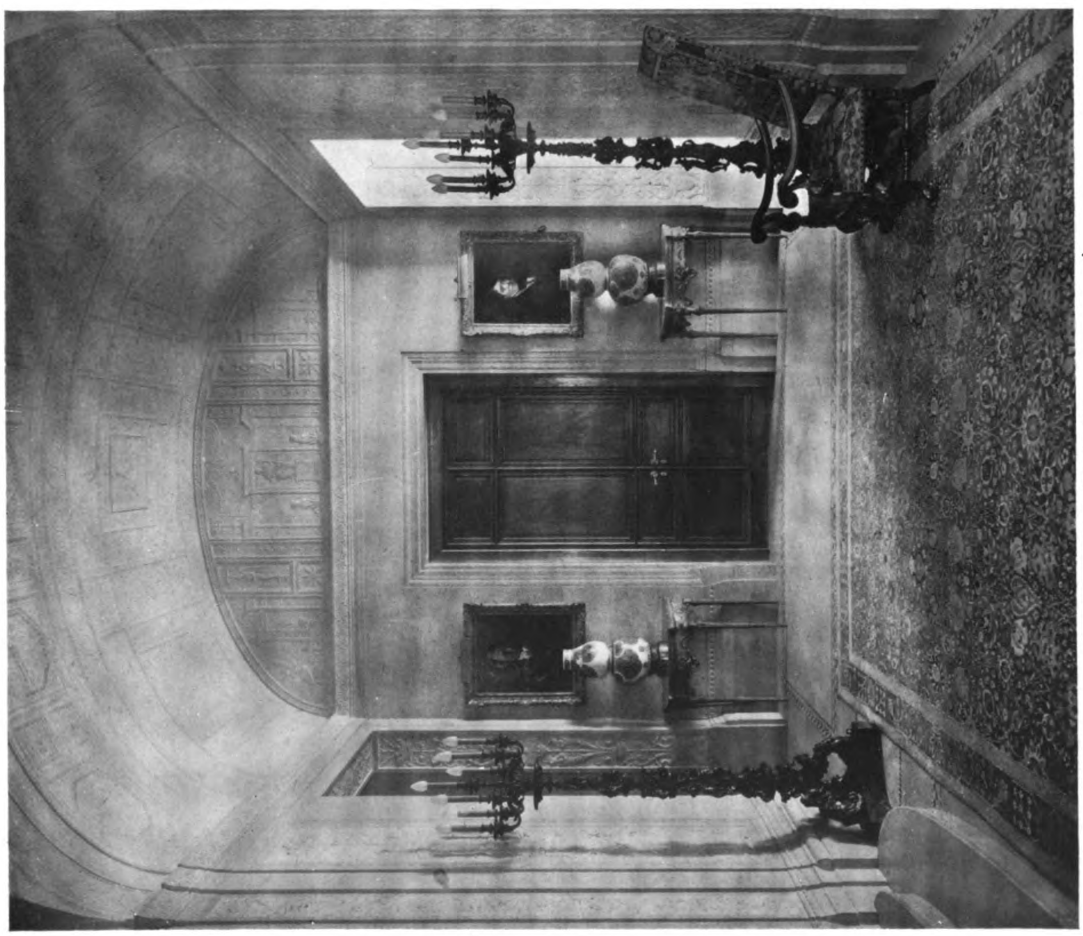
ELEVATOR DOORWAY

HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT



DETAIL OF PLASTER CEILING



ENTRANCE HALL

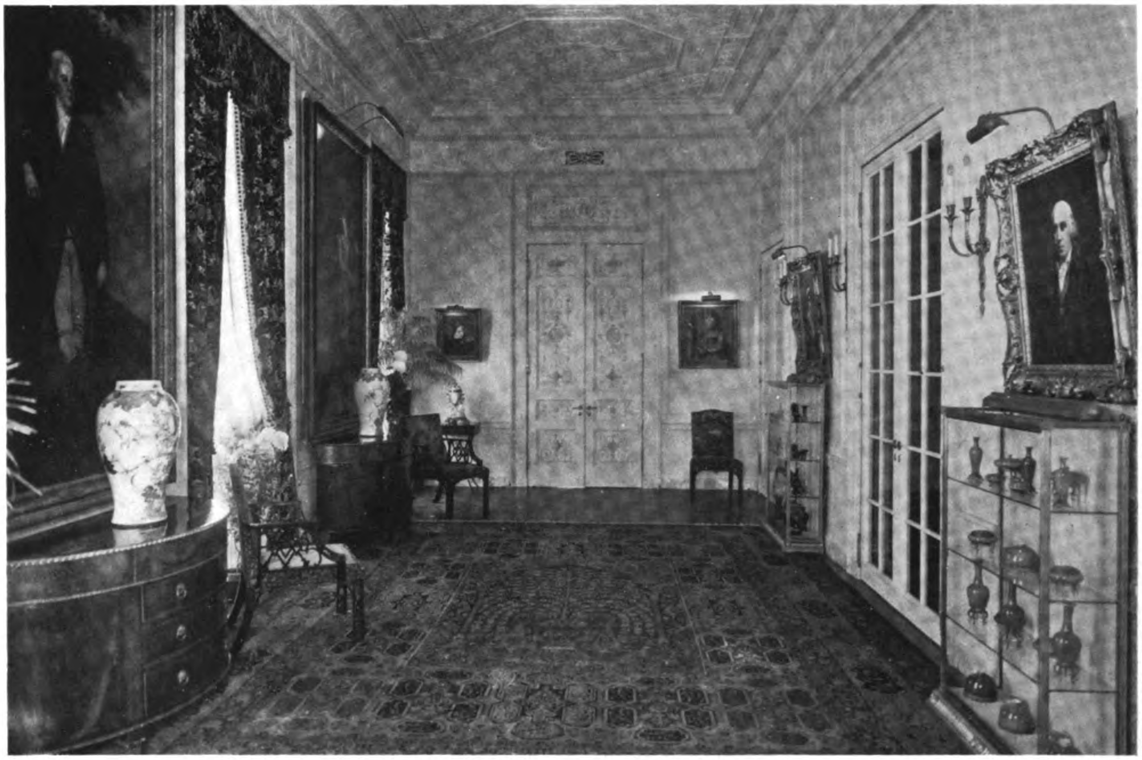
HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT

DETAIL OF ENGLISH PAINTED PINE CHIMNEYPIECE IN DINING ROOM

HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT



SECOND FLOOR GALLERY

PLAYROOM ON ROOF

Mural Decorations by Robert Winthrop Chanler

HOUSE OF MRS. WILLIAM HAYWARD, NEW YORK

GUY LOWELL, ARCHITECT

ITALIAN RENAISSANCE DETAILS

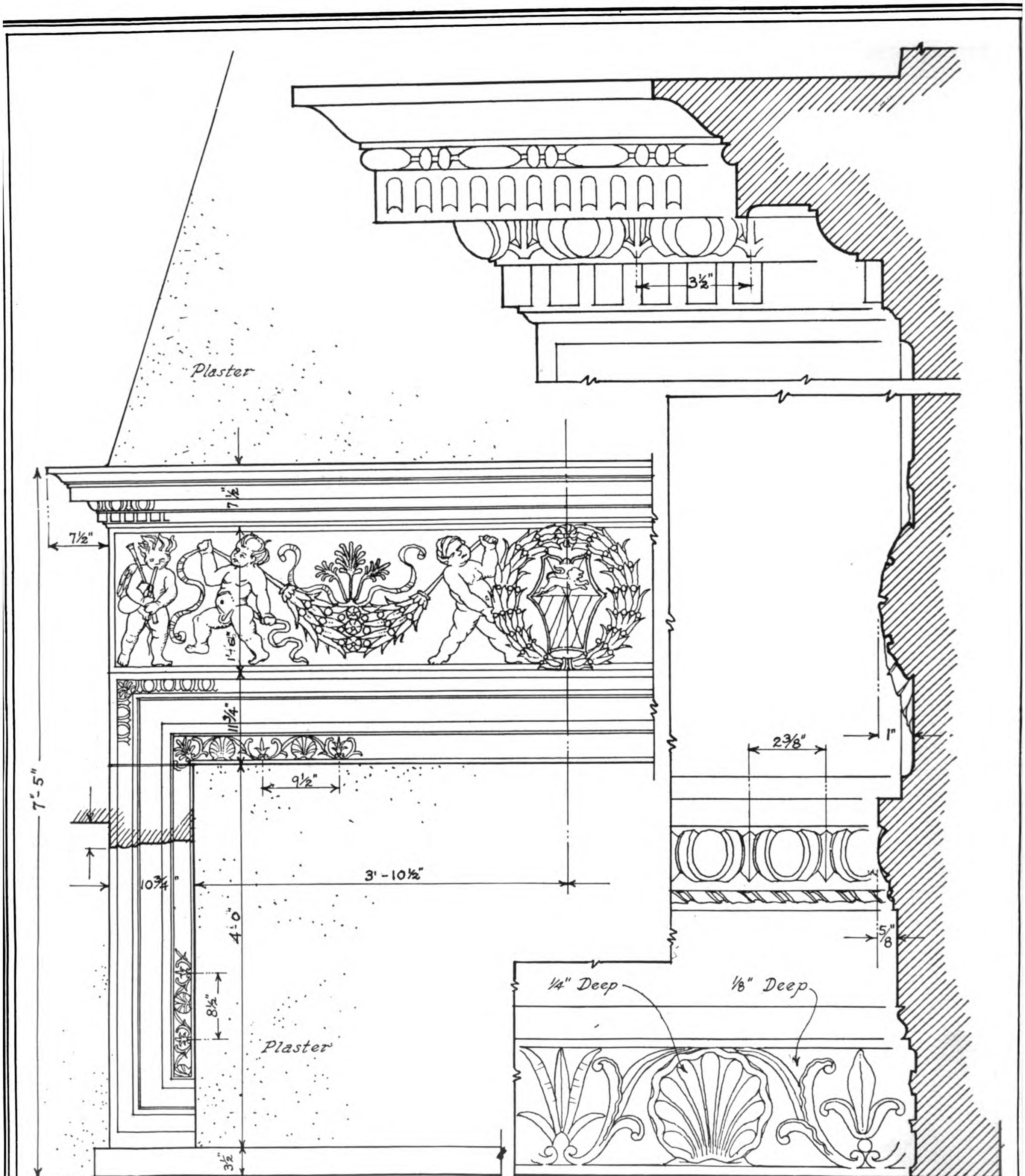
A SERIES OF MEASURED DRAWINGS

By HOWARD MOÏSE

CHIMNEYPIECE IN LARGE HALL OF MAIN APARTMENT

PALAZZO DAVANZATI, FLORENCE

PALAZZO DAVANZATI is one of the few structures still remaining from the period when Florence was at the height of her power. Built originally for the Davizzis, it remained in the hands of the Davanzati family from 1578 to 1838, falling then into decay from which it was rescued by Prof. Volpe, restored and furnished with much of its oldtime magnificence. The large hall of the main apartment still retains its old painted and cross-beamed ceiling, and the stone chimneypiece illustrated here is adorned with figures of dancing children, carved in spirited fashion, while the hooded form which the wall over the chimneypiece assumes tends to minimize the expanse of space between the cornice of the chimneypiece and the ceiling.



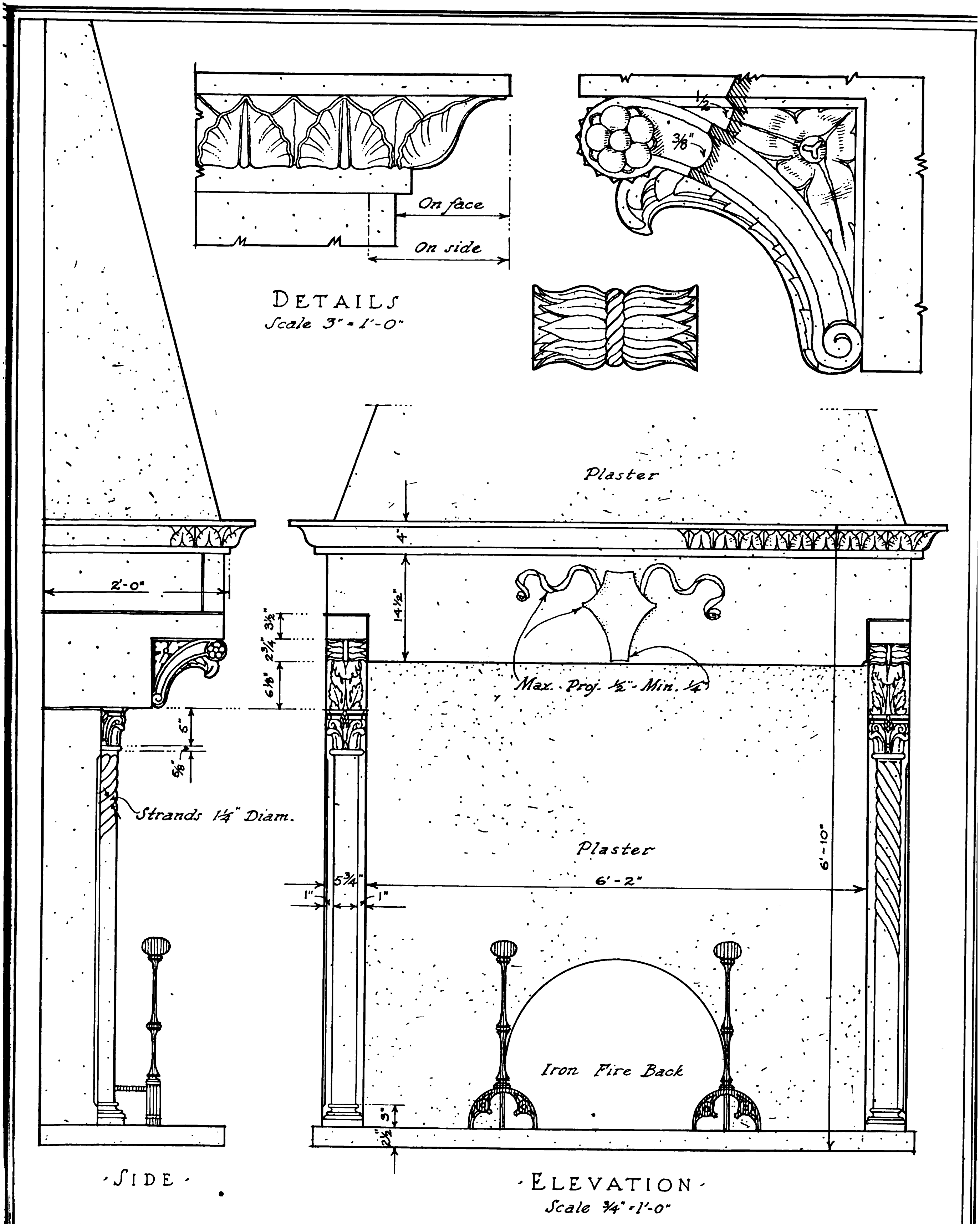
ELEVATION
Scale ¾"=1'-0"

DETAIL
Scale 3"=1'-0"

ITALIAN DETAILS 1922

·FIREPLACE·
PALAZZO·DAVANZATI·FLORENCE

MEASVRED *and* DRAWN *by* HOWARD MOÏSE

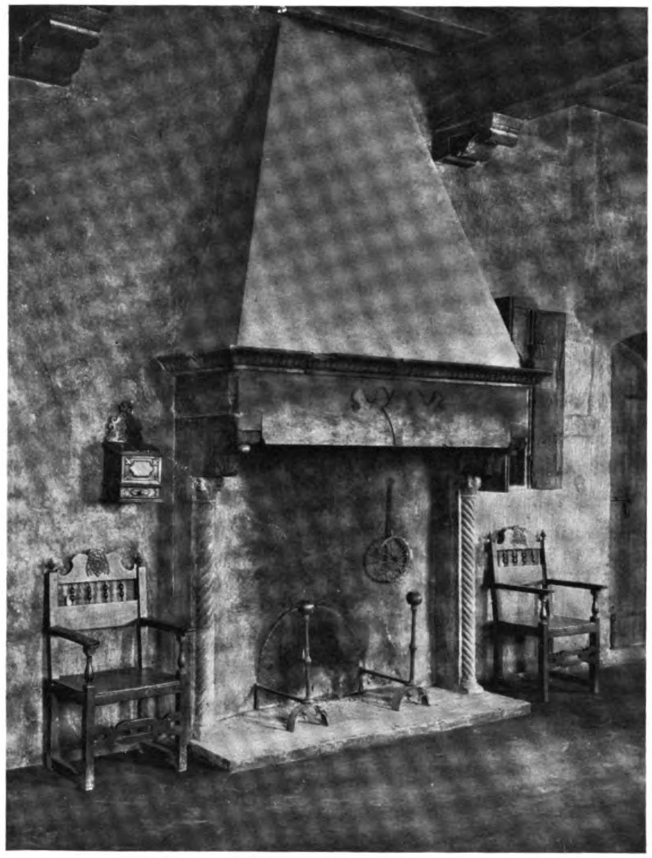


ITALIAN DETAILS 1922.

·FIREPLACE· PALAZZO·DAVANZATI·FLORENCE

MEASVRED and DRAWN by HOWARD MOÏSE

ITALIAN RENAISSANCE DETAILS



A CHIMNEYPIECE IN A MINOR APARTMENT

PALAZZO DAVANZATI, FLORENCE

DESIGNED like all the great palaces of old Italian cities to shelter various members of a large family in patriarchal fashion, this building includes many great halls and rooms of other kinds, from one of which the chimneypiece illustrated here has been drawn.

It is a particularly good example of the Italian hooded mantel supported by corbels, and lends itself readily to modern adaptation because of its good scale and general simplicity. The carving is in low relief, hardly any portion having a depth of more than one-half inch. The Davanzati Palace was designed by Michelozzi, the successor of Brunelleschi.

BUSINESS & FINANCE

C. Stanley Taylor, *Editor*

Recent Progress in Developing Co-operative Apartment Buildings

ABOUT two years ago there was presented in a series of articles in THE ARCHITECTURAL FORUM a general review of progress to that date in the development of co-operative apartment house projects. In view of the large volume of building construction which has occurred in the apartment house field since that time it is but natural that there should have been a crystallization of ideas and a broadening of experience in this field which is of considerable interest to those who contemplate carrying out such projects in the near future. In this article, therefore, we shall consider certain business features which have become more definitely established as important factors in the success of a co-operative building venture.

One important conclusion which may be drawn from the added experience of the past two years in this field is that in the development of a co-operative building project success is more certain under what is termed "the 100 per cent" plan of ownership. When this subject was last reviewed in THE FORUM past experience had left open a choice between two plans: first, the 100 per cent plan, in which the entire building is occupied by tenant-owners, and, second, the rental and ownership plan under which a proportion of the building space is reserved for renting at prevailing market rates.

While it is quite logical to assume that the rental income from such space will serve to reduce the overhead cost of occupancy on the part of tenant owners, experience has shown that the added detail of operation and management, the increased investment required, and the danger of being forced to carry unrented space during periods of depression would seem to overbalance any benefit which might directly accrue through rental profit on the space not occupied by tenant-owners. In other words, it has become almost axiomatic in the field of co-operative apartment promotion and ownership that the only successful plan is the 100 per cent ownership plan.

A number of interesting facts and opinions relative to this and other points of importance in a consideration of the co-operative plan have been drawn from comments made by Frederic Culver, President of the Joint Ownership Construction Company. This is the company which developed the building at 136 East 67th street, New York, illustrated in this number of THE FORUM. The exact business methods of this building indicate some important points:

"A corporation known as 136 East Sixty-seventh street, Inc., was formed in which title to the property was vested. The stockholders are the occupants of the building. Thus a tenant-owner has an interest in the entire property and is entitled to a 99-year lease on the apartment which he selects. The lease, with his stock, gives him virtual ownership of his apartment. Every apartment in the building is sold. No space to rent is reserved, and therefore speculating in renting apartments and carrying vacancies are eliminated, as every individual owner pays a pro-rata share of the operating expenses of the building. It is a fixed annual sum and precludes the right to make any assessment.

"Reducing apartment rents to just what it would cost a landlord to operate the building is precisely what is achieved, and all landlord's profits are eliminated. In other words, all that an owner pays is exactly what it costs to run the building. It is a logical fact that 25 people can operate one building more cheaply than they can operate 25 separate dwellings. Joint ownership affords a home to a purchaser at less than it can be maintained for in any other way.

"The building has been restricted as to the character and financial responsibility of the tenant-owners. The directors of the corporation, elected annually from among the stockholders for a year, pass on all subleases and resales. In that way the building's original standing is maintained, and although it may restrict the market as regards resale to a certain extent, it considerably enhances the value, as people are willing to pay premiums to purchase in a house having the highest class of occupants. In other words, the directors act in the same capacity as does the committee of admissions to a club. The actual management of the building is taken care of by Culver & Co., affiliated with the Joint Ownership Construction Company, Inc. In that way the operation of the building is in the hands of an experienced concern, relieving the owners of care in that respect.

"There are two aspects to the situation which would have a great influence in determining the future of co-operative enterprises for urban community buildings. One would be whether or not the majority of future developments would be along conservative or quasi-speculative lines. If the investment public should pursue the speculative line, that course would be attended with more or less danger and might retard or kill the movement. For that reason the plan of making a success of the enterprise depends on renting at the prices specified in the promotion plan. If apartments to rent on speculation were included and the prices presumed to be obtained for this space not be obtained the owners would have to make up the deficit, which would react on the investing public. To avoid that danger this company determined to sell stock covering every apartment in the building erected by it and thus by determining the maximum fixed sum its clients would be called on yearly to pay prevent their suffering any disappointment.

"It is more difficult to sell under that plan because it seems to call for a larger fixed annual rent charge than do more speculative plans. These specious proposals, involving rent speculation, lead investors to think that they will get the results that the promoter specifies (the promoter always puts his best foot forward), and are bound to please the unthinking investor more than a more conservative plan.

"It is obvious that if a building were financed on the plan of 90 per cent of the value in mortgage and 10 per cent in stock, whether it were 100 or 50 per cent joint ownership, the price to be paid for the stock would be comparatively small, and if the mortgage were 40 per cent and the equity 60 per cent of the value the cost of the stock would increase, and so would the safety factor. A mortgage of 40 per cent on a first class building

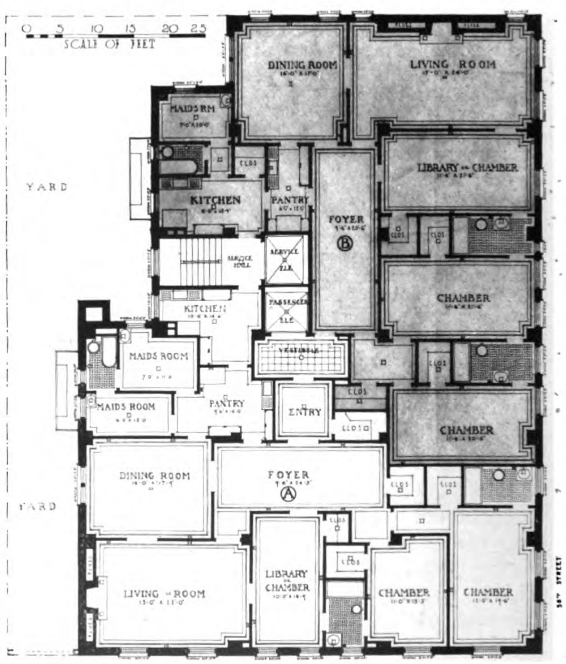
Co-operative Apartment House, 485 Park Avenue, New York
Dwight P. Robinson & Co., Engineers and Constructors

in a first class location in New York should, under normal conditions, be easily and at all times replaceable. For the ultimate success of co-operative apartment enterprises on a very large scale two factors are essential: first, the ability of the owner of that class of stock to borrow on it from a bank or trust company, and, second, the marketableness of the stock in question.

"It seems to be a perfectly logical evolution, if we grant that in cities the apartment house is bound to displace the private residence, that the form that the organization will take will approximate in every essential something akin to private houses, so far as to transfer to title is concerned. The general form that the co-operative apartment investment has taken makes the securities given in representation of ownership, from every point of view, much more marketable than the private residence. For instance, a title insurance policy covers the title; the transfer of title means merely the endorsement of a stock certificate and the examination of the roll of occupants of the building and of its books, which are kept, under good practice by some responsible trust company, to ascertain if the revenue paid by the tenant-owners is more than sufficient to defray the cost of operating the building. In a very brief period the proposed purchaser in one of those enterprises has a trustworthy statement which will enable him to decide as to whether or not he is justified in making his investment. In those types which represent the best plan of organization an investor would find that by becoming an owner his savings in rent over what he would pay to a commercial landlord would be at least equivalent to 12 per cent a year on the amount of money invested. The test of the proposal would be that if the owner made his investment and did not occupy the apartment in connection with his purchase, he would be able to find a tenant who would pay him a rent which, after deducting the sum to be paid to the company, the stock of which he purchased, would leave him a return of 12 per cent a year on his money."

The working out of the financial aspect of a project such as this requires care, and to those who are making a study of this subject some of the cost maintenance and rental figures on this new building, 136 East 67th street, will be of interest. The total cost of the building to the tenant-owners, including land, construction costs, architects' fees, and a reasonable profit for the promoters, amounted to $630,000. A first mortgage was placed on this building for $300,000. The equity of $330,000 represented in this transaction is the amount of stock issued to tenant-owners, divided in accordance with the character and size of various apartments. In order to show how this division was made a tabulation is presented showing the price of each apartment in the building. This price represents the owner's share in the equity above his proportion of the first mortgage. In this tabulation the yearly proprietary rentals are also shown. These are determined by estimating the total operating expense for the building, in this manner:

Interest on $300,000 mortgage at 6%	$18,000
Taxes on $480,000 less $185,000, or on $295,000 at 3%	8,850
Coal	2,400
Insurance (fire and general)	700
Operating force	5,280
Supplies	500
Water, light and power	1,000
Management	1,300
Amortization of mortgage annually at 3%	9,000
Contingencies	2,470
Aggregate of annual proprietary rents	$49,500



Typical Floor Plan, Co-operative Apartment House
485 Park Avenue, New York

Here is a tabulation showing individual apartment costs and proprietary rentals:

Designation	Number of rooms	Number of square feet	Price	Yearly proprietary rental
A-1	6 rms.—2 baths	1510	$11,300	$1,695
B-1	4 " —1 "	1035	7,700	1,155
C-1	4 " —1 "	970	7,300	1,095
D-1	3 " —1 "	575	4,300	645
E-1	3 " —1 "	575	4,300	645
F-1	4 " —1 "	970	7,300	1,095
G-1	4 " —1 "	1035	7,700	1,155
H-1	6 " —2 "	1510	11,300	1,695
A-2	6 rms.—2 baths	1510	12,000	1,800
B-2	4 " —1 "	1035	8,100	1,215
C-2	4 " —1 "	970	7,700	1,155
D-2	4 " —1 "	765	6,100	915
E-2	4 " —1 "	765	6,100	915
F-2	4 " —1 "	970	7,700	1,155
G-2	4 " —1 "	1035	8,100	1,215
H-2	6 " —2 "	1510	12,000	1,800
A-3	6 rms.—2 baths	1510	12,600	1,890
B-3	4 " —1 "	1035	8,600	1,290
C-3	4 " —1 "	970	8,000	1,200
D-3	4 " —1 "	765	6,400	960
E-3	4 " —1 "	765	6,400	960
F-3	4 " —1 "	970	8,000	1,200
G-3	4 " —1 "	1035	8,600	1,290
H-3	6 " —2 "	1510	12,600	1,890
A-4	6 rms.—2 baths	1510	13,200	1,980
B-4	4 " —1 "	1035	9,000	1,350
C-4	4 " —1 "	970	8,500	1,275
D-4	4 " —1 "	765	6,700	1,005
E-4	4 " —1 "	765	6,700	1,005
F-4	4 " —1 "	970	8,500	1,275
G-4	4 " —1 "	1035	9,000	1,350
H-4	6 " —2 "	1510	13,200	1,980
A-5	3 rms.—1 bath	1030	9,600	1,440
B-5	4 " —1 "	1300	12,200	1,830
C-5	6 " —2 "	1225	11,500	1,725
D-5	4 " —1 "	1300	12,100	1,815
E-5	3 " —1 "	1015	9,600	1,440

The proprietary rents in the aggregate cover all running expenses and amortization of mortgage.

The subscriptions of prospective tenant-owners in this operation were made payable upon this schedule:

		Per cent
1.	On signing	10
2.	When title is vested in owning company	15
3.	When foundations are completed, not sooner than one month after last payment	15
4.	When concrete work of floor for second story of building is in place, not sooner than one month after last payment	10
5.	When concrete work of the floor for the fourth story of the building is in place, not sooner than one month after last payment	15
6.	When roof is on the building, not sooner than one month after last payment	10
7.	When brown coat of plaster is on the building, not sooner than one month after last payment	15
8.	On completion of building	10
		100

Another interesting co-operative apartment building which has just been completed in New York is the structure at 485 Park avenue, developed under the management of Douglas Elliman & Company. Here again experience has shown the soundness of the 100 per cent plan. In this connection Mr. Elliman is authority for the statement that "co-operative apartment house ownership is tenant ownership. It does not mean that you buy an apartment simply, but that you actually invest with others in real estate. The inducement lies in the saving in rental. The only dangers are in trying to get too much out of the investment and in improper management. As an example, a man buys a co-operative apartment, say for $10,000. Assuming that he had invested that amount at 6 per cent, which would be a fair supposition, his interest would have been $600 a year on that amount. The upkeep of the apartment would be about $1,000 a year.

Kitchen

Sun Parlor

Typical Interiors in Hawthorne Court Apartments, Jackson Heights, New York
George H. Wells, Architect

Adding the $600 interest would make a total of $1,600, which he would charge to one account. The theoretical rental value of the apartment would be, according to the average of our experience, approximately $3,200 a year. Consequently he would save 30 to 50 per cent on his rental. His profit would be the difference between $1,600 and $3,200 or $1,600."

The total cost to the tenant-owners of the building at 485 Park avenue was $1,100,000. Of this amount $540,000 is in the form of a first mortgage, and the balance, or $560,000, is represented in stock.

As will be noted by reference to the floor plan presented herewith, these are large apartments, arranged two to a floor, excepting on the eleventh, twelfth and fourteenth floors which are occupied entirely by one apartment each. The typical apartment A represents an investment by the tenant-owner of $26,000. His proprietary rental is $3,120 per year for an apartment which has an approximate rental value of $6,500 per year. Apartment B represents an investment of $22,400, carries a proprietary rental of $2,688, and has a market rental value of approximately $5,600. In estimating the proprietary rental the total expenses of carrying this building are:

Estimated annual expenses:	
Labor	
2 doormen at $80	$1,920
2 passenger elevator men at $75	1,800
2 service elevator men at	1,800
1 night fireman at	1,200
1 day fireman at	900
1 porter at	960
1 superintendent at	1,800
	$10,380
Lay-off in summer	1,040
	$9,340
Fuel	$3,500
Electricity (net)	1,000
Water	500
Supplies	250
Repairs and decorations	3,500
Insurance	1,100
Administration	5,000
Gas	50
Miscellaneous	2,000
Total operating expenses	$26,240
Taxes (estimated)	$18,000
Interest on first mortgage	32,400
Estimated total expenses	$76,640

Progress at Jackson Heights

In the last two years there have been a number of interesting developments in connection with the great co-operative apartment development of The Queensboro Corporation at Jackson Heights, New York. These buildings, some of which are illustrated in connection with this article, and others designed by Andrew J. Thomas in previous issues, represent still more interesting types of architecture and construction than earlier structures in this development. In line with increased building costs the management of this corporation wisely decided that the more expensive type of apartment was in order, and no pains have been spared to develop a high standard of attractiveness and living comfort.

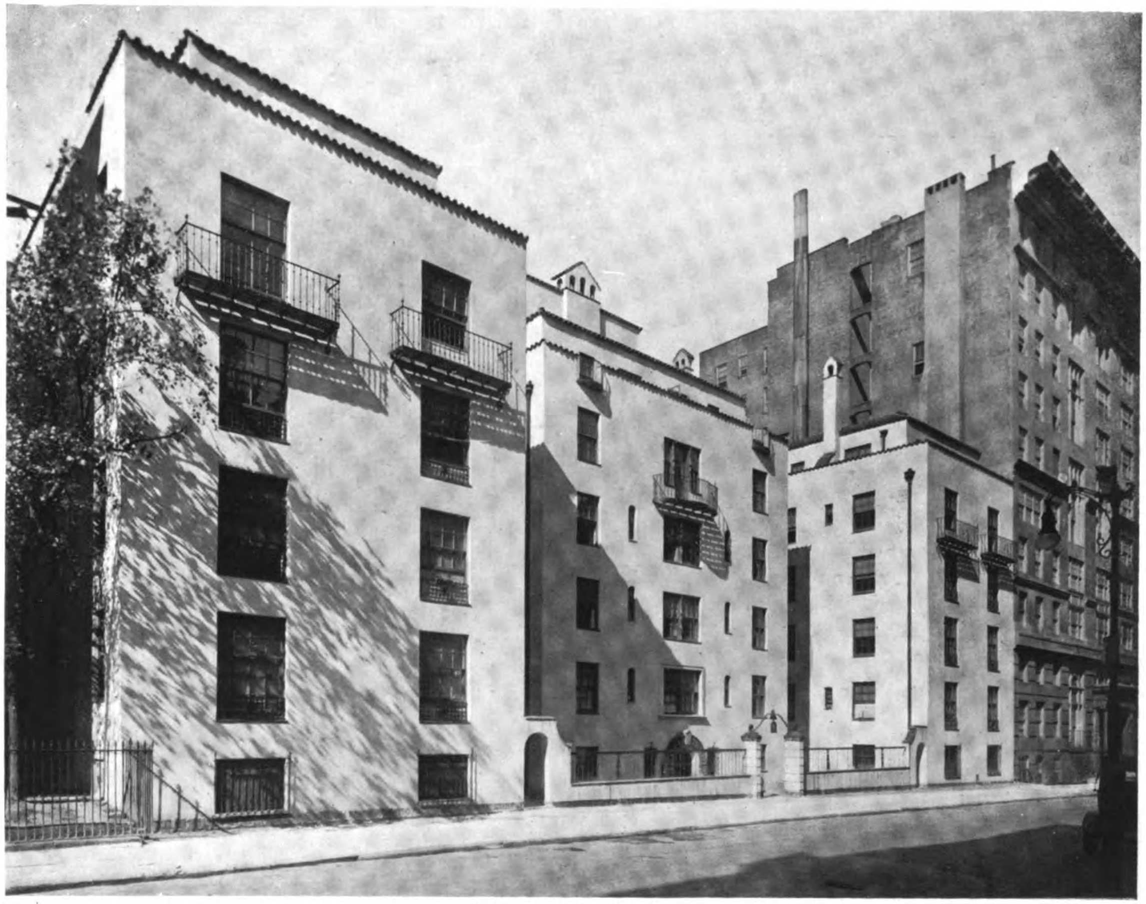
Commenting on the experience of his organization, F. R. Howe, Vice-President of The Queensboro Corporation, has made claim that when "certain fundamental conditions are observed, tenant-ownership of apartments shows a greater economy with equal comfort as compared either with the ownership of a house or with the out and out rental of an apartment. These fundamental conditions are thus briefly presented:

1. A fair price.
2. Safe financing.
3. A neighborhood of established or growing values.
4. Careful selection of tenant-owners, to insure harmonious relations.
5. Expert management.

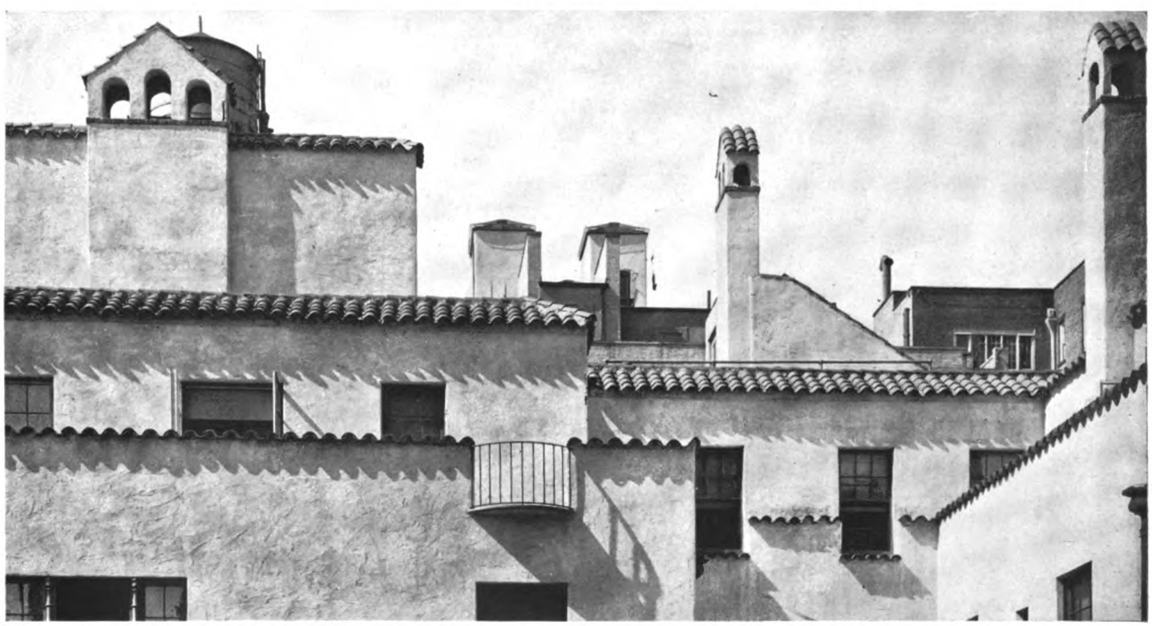
"Reviewing these conditions as they affect Jackson Heights, first with regard to price: The policy of the building up of Jackson Heights has been to charge a fair or normal profit on a large number of buildings, rather than to attempt to make a large profit out of each particular group. The soundness of such a conservative policy has resulted in the fact that many of the tenant-owners at Jackson Heights who have been forced to move to other cities have been able to sell their interests at substantial profits, and they have all made substantial savings by becoming tenant-owners since the inauguration of the plan in the summer of 1919.

"Sound financing of apartment buildings is the same as in other investment enterprises; the relation of the mortgage indebtedness to the entire investment should not exceed one-half, or at the most 60 per cent. At Jackson Heights one-half has never been exceeded, and in some cases the mortgage has been for considerably less than one-half of the value of the enterprise. One of the greatest abuses that tenant-ownership has been subject to has been overloading the properties with two and three, and in some instances four mortgages, which places the purchaser in the same position as the 'shoestring' margin trader in Wall street—the first puff of adversity wipes him out.

"The stability of the neighborhood as a residential district is of great importance to investors in co-operative apartments, and when the neighborhood is of steadily increasing value, the investment is more certain to appreciate with the growth of the neighborhood. Such a condition is presented by the development at Jackson Heights. Starting a few years ago with three or four 5-story apartments, now more than 100 apartment buildings have been constructed or are in course of erection. The careful selection of tenant-owners is a *sine qua non* of successful tenant-ownership. Rigid examination of business and social references is an essential point where people are collective owners of apartments, and nowhere has greater care been used than at Jackson Heights, where in the selection of over 700



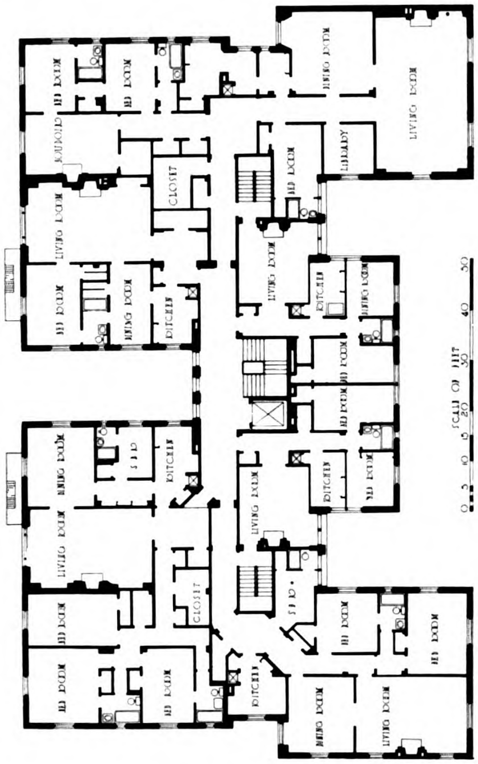
GENERAL EXTERIOR VIEW



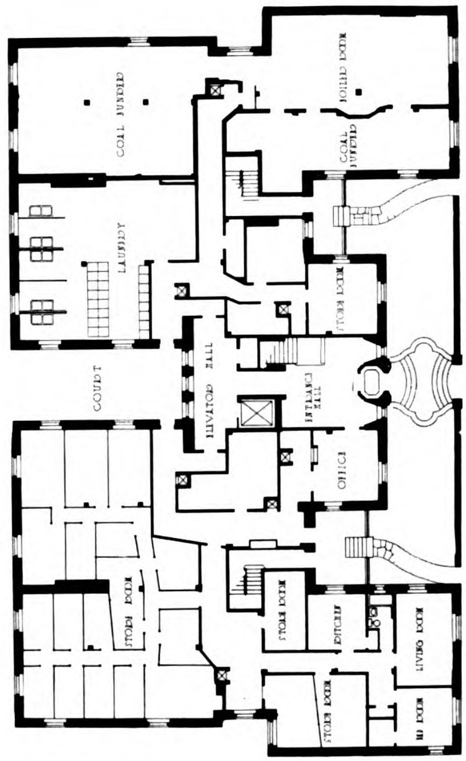
DETAIL VIEW OF UPPER STORIES

CO-OPERATIVE APARTMENT HOUSE, 136 EAST 67TH STREET, NEW YORK

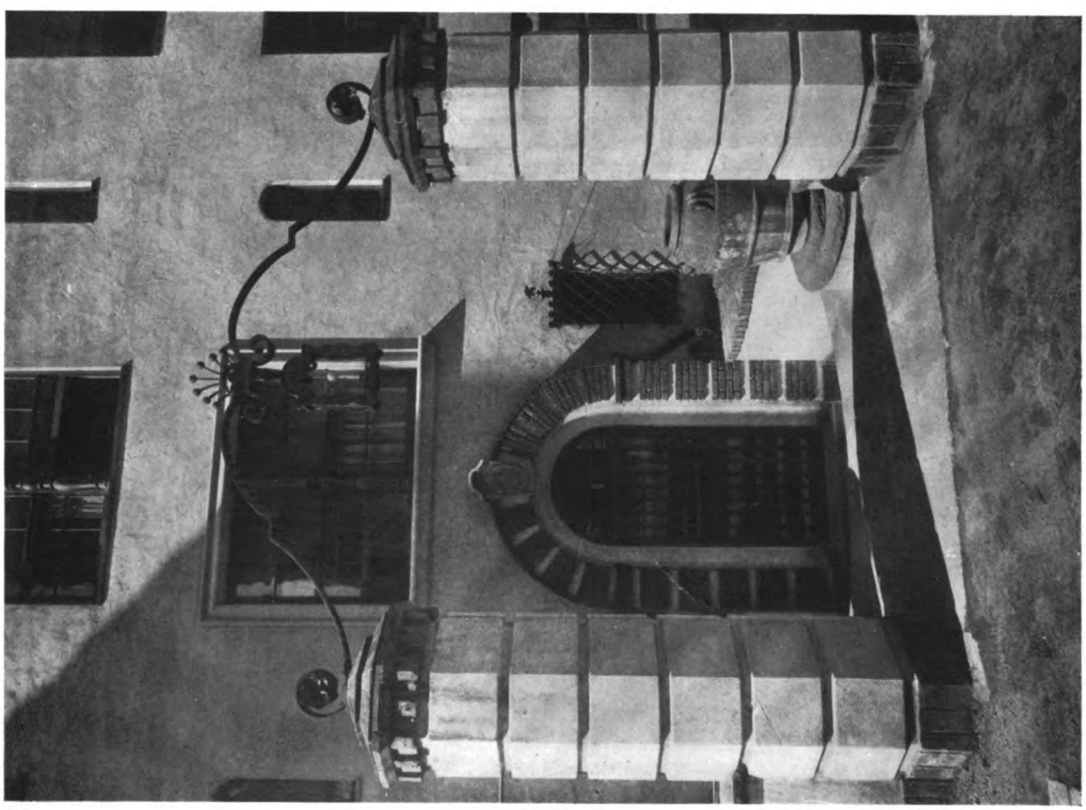
WALKER & GILLETTE, ARCHITECTS



SECOND FLOOR PLAN



FIRST FLOOR PLAN



DETAIL OF ENTRANCE

CO-OPERATIVE APARTMENT HOUSE, 136 EAST 67TH STREET, NEW YORK

WALKER & GILLETTE, ARCHITECTS

present tenant-owners not one mistake has been made in admitting an undesirable owner.

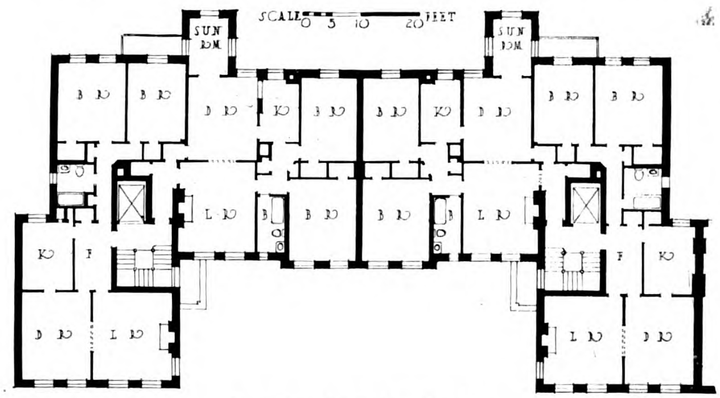
"Many co-operative apartment houses starting out with good financial plans and careful selection of owners have come to grief through amateur management. The business of apartment management is just as much a business as factory management. It should be in expert hands. Like factory management, large scale operations secure reductions in cost. At Jackson Heights The Queensboro Corporation manages the entire enterprise. Over one hundred 4- and 5-story apartment houses in one neighborhood are managed by this corporation, so that large economies are effected in the purchase of such items as coal and in the general direction of the enterprise.

"Recent figures covering the sale of stock representing a high class apartment in one of the new buildings at Jackson Heights will be of interest for comparative purposes. The apartment taken as an example is a 7-room and 3-bath apartment which is one of eleven apartments in a 5- and 6-story elevator building which is priced at $213,000 and in which the mortgage is only one-third of the cost. Here the running expenses, including elevator service, janitor service, light, heat, etc., are estimated at $3,400, and the fixed charges, including taxes in excess of exemption, interest, insurance and management amount to $7,000.

"In determining the quota to be paid by tenant-owners, there was added $2,100 amortization on the mortgage, which is at the rate of 3 per cent per annum, and $850 as a reserve to meet contingencies.

"Turning now to the individual apartment. This apartment could not be rented elsewhere in New York at the present time under from $3,000 to $4,000. The cost to buy is $13,000, which represents its share of the equity in the entire building. It may be purchased under the installment plan by paying down a minimum payment of $3,500 and paying the balance as rent. This balance includes all of the foregoing items of upkeep, fixed charges, etc., and is $103 per month. $123 is the monthly installment, including interest on the deferred balance, making a total of $226 per month or $2,700 per year."

These payments will purchase the entire equity of the apartment, valued at $13,000, in eight years. Comparing this with an apartment renting for $3,000 per annum, in eight years there would have been paid $24,000 as rent. Under the installment tenant-ownership plan, in addi-



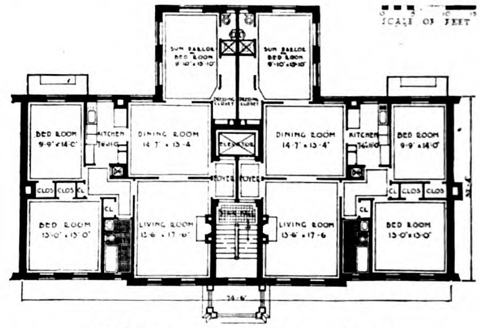
Typical Floor Plan of Laburnham Court

Co-operative Apartment House Group, Jackson Heights, New York

Exterior of Laburnham Court Apartments and Community Tennis Courts

George H. Wells, Architect

Rear View, Showing Garden Treatment in Center of Block
Jackson Heights, New York



Typical Floor Plan, Hawthorne Court

tion to the $3,500 initial payment there would have been paid to meet running expenses, interest, insurance and installments, $25,196 in eight years.

The result in one case is the ownership of nothing; in the other case, the full paid ownership of an equity of $13,000 and the reduction by 24 per cent in the share of the mortgage upon the building, which is $1,600 reduction for this one apartment; furthermore, a payment into reserve for contingencies of over $600 is effected for this one apartment, and in addition the incalculable amount of saving due to a possible reduction in the future in the cost of operating the buildings, all of which accrues to the tenant-owner, so that with every decline in the cost of operation there is increased saving.

One more fact is interesting to know in this connection. Under the original sales plan of Jackson Heights the owner's rental of an apartment was established at a high enough figure to make it possible to pay 7 per cent interest on the stock representing tenants. Within the past two years it has been deemed wise to eliminate this interest feature and to charge an owner's rental only sufficient to cover running expenses. This has been done for two reasons: first, because the 7 per cent return to the owner in the form of interest on his bonds offered taxation difficulties, and, secondly, because this action withdrew a complication in the sales plan, for the more simple a sales plan for promoting a co-operative venture can be made the more readily will success be attained.

In this series of articles the most important details of a successful co-operation project have been covered, but each operation involves individual consideration and presents specific problems, in solving which a special service is offered to readers.—The Editor.

Exterior of Hawthorne Court Apartments, Jackson Heights, New York
George H. Wells, Architect

ENGINEERING DEPARTMENT

Charles A. Whittemore, *Associate Editor*

The Hotel or Restaurant Kitchen

By N. W. ALDRICH

PROMPT and smoothly running service, upon which depends the success of a restaurant or a hotel dining room, is almost entirely a matter of its being served by well equipped and well arranged kitchen and other service quarters. An examination of a successful restaurant kitchen will show that it has been so planned and organized that it becomes a kind of mechanism, not readily thrown out of balance by unexpected demands upon it.

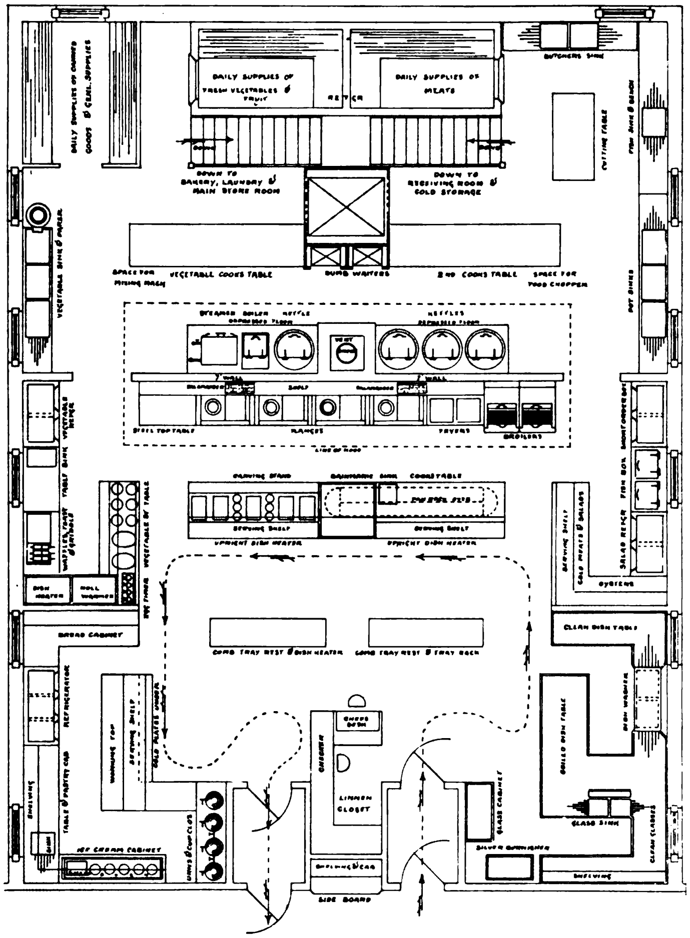
To make plain what is meant by a well planned and equipped restaurant kitchen a diagram is given which may serve to illustrate the suggested layout. While the plan will to a certain extent explain itself, it is the writer's aim to explain how important it is to bring such departments as are shown on the plan, and especially those in the serving department, as near as possible to the dining room.

It would be almost impossible to give the exact capacity of such a kitchen, owing to the fact that this depends wholly upon its supervision. Stewards as a rule are accustomed to certain ways of running their departments, and some of the most competent in their line may not be familiar with or understand plans as well as an architect or engineer who would consider it his duty to see that such plans are thoroughly understood. Relative to capacity, however, this kitchen with proper supervision should be large enough for the dining room of a medium sized hotel, say of 400 to 500 rooms, or for a restaurant with a seating capacity of from 300 to 400. With the limited amount of space available for this kitchen, say 45 x 60 feet, the receiving room, storeroom, bakery, laundry, employes' dining rooms, etc., are located on the floor below and should be properly lighted and ventilated.

Although it is not advisable to recommend every kind of apparatus that may be used in kitchens without first consulting the owners, managers or stewards, care should be taken that space be allowed for such fixtures in order that these may be installed at a later date without interference with the more essential details which are already in place. The section of the kitchen where dishes, silver and glass are washed should be so arranged that waiters or 'bus boys may deposit used dishes at soiled dish tables without interference with those working in this department. A large soiled dish table should be so arranged that glasses and silver as well as dishes may be cared for in this corner of the kitchen. Dishes should pass through a dish washing machine to the clean dish table where they are assorted and placed in heaters or on shelves, and glass should pass in an opposite direction to glass washer or glass sink and be dried ready to return to cabinet or dining room. Silver may be washed in the same machine as dishes and then passed to where it is sorted and dried, but as dish water is always greasy, glasses should be washed either in a separate machine or a double sink. They never look bright and shiny unless properly wiped. A silver burnisher will also be found practical, and since it is considered one of the essentials, like the machines for cleaning and polishing steel knives, space has been allowed for all these details on the plan. The oyster bar and bar or counters for salads and cold meats, together with a short order or cut meat box and sea food chest, are so arranged that a shortage of help would not cripple the service as it would if these departments were scattered, and waiters ordering from these departments are served over the shelf at convenient height above the working top of the salad bar. The combination feature, including cook's table, bain marie and carving stand, is so located and equipped with upright dish heater that several waiters may be served at the same time without interference, the top of the dish heater being used as a serving shelf, and the two tables in the center of the floor being useful for resting trays while loading as well as for warm dishes and clean tray rack.

The section where the vegetable cook performs her duty while serving is provided with steam table, roll warmer, dish heater, table, and combination griddle, toaster and waffle iron; also with sink and refrigerator for cooked vegetables. The egg timer is so located that the waiters themselves may attend to boiling eggs at breakfast time. This vegetable steam table should be provided with dish heaters, under the table as well as overhead, and a serving shelf with space under the roll warmer arranged for storage purposes.

Next in line we have the serving pantry, equipped with bread and pastry cabinets; a refrigerator for fruits, dairy products, etc.; sink; ice cream cabinet; urns and urn stand with cup closets, and serving counters, equipped with overhead shelves; drawers and shelving on the working side, and narrow shelves for cold plates and possibly silver boxes on the service side. By carefully planning this serving pantry



there will be found shelf room enough to care for quantities of dishes, tea and coffee pots, etc., as well as food, and sufficient amounts of both should be stored for each serving period.

By locating the checker's desk in the center of the kitchen it will be possible for her to observe the service as well as performing her duty as checker.

Going to the rear of the kitchen, or at the back of the cook's table and carving stand, where ranges, broilers, kettles and steamers are installed, there is in this case a tile wall dividing the ranges and broilers where order cooking is done from the steam fixtures. It is not necessary for this wall to be more than 6 feet high, excepting of course at the vent stack located in the center. A large canopy or hood covering these fixtures should carry off the greater part of the smoke, steam and fumes, and where coal ranges are used for cooking, a steel stack enclosed in vent stack as shown on the plan would provide natural draft which in most cases is sufficient. The floor under the steam fixtures should be depressed and properly drained in order that it may be kept clean. Other floor drains are important, but should be so located that they will not interfere with service. The butcher shop, where daily supplies of meat, fish, etc., are prepared, is conveniently located and can on short notice replenish the cut meat or fish supply for the cook.

The opposite side of the room, used for preparing and cooking vegetables, is but a few steps from the station where they are served. Space for the mixing machine, food chopper and other extra equipment may easily be obtained in this room, and with elevator and dumb-waiters as well as stairways to other auxiliary departments, this kitchen should prove itself to be both practical and economical.

In many cases where space is available it is considered more practical to have the various branches partitioned or separated. In such cases there are separate rooms for washing dishes and glass and also a silver room which will of course keep one person busy all of the time, and many more part of the time, especially if out of sight of the steward or chef.

No doubt the larger kitchens may be looked upon from a different standpoint, owing to the fact that each of these units is of such size that a much larger force is required for operating. The same principle, however, applies in both cases, and in this particular case the object in view is to show a kitchen of medium capacity which can be operated at minimum cost and at the same time produce quick service.

Aside from the steward and his assistant, such a kitchen should be operated with the minimum number of attendants: chef and second cook; two broiler and fry cooks; roast cook; two butchers; two salad men; two oyster men; a vegetable cook with four assistants; four girls in the serving pantry; twelve employed in washing dishes, glass and silver; two general kitchen men, and two checkers. This is based on giving full hotel service where two shifts are required, and aside from extra work at the carving stand this number should be sufficient to care for banquets as well as for regular dining room service. This combined service unit, together with a properly organized dining room force, should be a guarantee of good service in every respect.

Providing a lunch room or cafeteria is installed, whereby this kitchen is depended upon for supplies, care should be taken in order that such a department be so connected with the kitchen that its service would in no way conflict with that of the dining room. In most cases where this department would be on a separate floor, elevators and dumb-waiters will add all necessary convenience.

Electrical Wiring Layouts for Schools

(CONCLUDED)

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

IN laying out the plans for the wiring of a school building the highly important subject of supplying power for the operation of various utilities must not be overlooked. These utilities are each year becoming more complex, and provision should be made for all immediate needs as well as for such possible future requirements as can be foreseen.

Motor Circuits and Power Wiring. Motors will be required throughout the building for the operation of ventilating fans, pumps, elevators, machine tools and other equipment. These motors are as a rule supplied by the contractors furnishing this equipment, but all wiring of the motors should be included under the wiring contract.

The motor circuits should be independent in all ways of the lighting circuits, excepting where motors of fractional horsepowers are to be used; such motors, however, should be of the single-phase type and wired for operation on 110 volts. They may be permanently connected to branch circuits from the lighting panels, or as portable equipment may be operated from any socket or receptacle on the lighting circuits. With direct current, each motor circuit requires two wires; with single-phase alternating current, two wires; with three-phase alternating current three wires, and with two-phase alternating current three or four wires, depending upon transformer connections.

With direct current, the voltage of the motor circuits will be either 110 or 220 volts; with alternating current either 220-440 or 550 volts, 60-cycle current, and it is of importance that the voltage, frequency and phase of the available motor current should be known before the work is laid out. All motor circuits should be installed in separate conduits and should be fed from the service switchboard, either singly, as in the case with large motors, or in groups where several motors are fed from one power main or riser.

With few exceptions, large school buildings will have two different service connections, one for the lighting service at single-phase, 110-220 volts, three-wire system, and another for the power service at the available motor voltage, either two- or three-phase current. An exception to this rule may be where the power company has not a three-phase or power line near the building, in which case it is sometimes necessary to use single-phase current, with the power company's permission, even on motors of large capacity. As a rule, however, single-phase motors of more than 2 or 3 horsepower in individual motors must not be installed and connected to the service.

Where the motor voltage is 220 volts or less, on any system, the smaller motors may be satisfactorily operated from the power circuits; where, however, the motor voltage is 440 or 550 volts, it is not advisable to operate any portable equipment, or motors of fractional horsepowers, and such small motors should be connected with the lighting service. This also applies to motors for the operation of the machines in the lunch room and kitchen, such as the dish washer, potato peeler, meat grinder, etc., as well as any machines and equipment that may be directly used by the instructors and pupils; when this is done, the specifications should call for single-phase motors for these machines, etc., for operation on either 110 or 220 volts.

Fans for the ventilation of toilet sections may be located on the roof, in an attic space, or elsewhere as may be convenient. Where so located, and where there is sufficient room to install controlling apparatus, the motors should always be operated from the power circuit. Where such vent fans are of the "ready to run" type and are located directly in the toilet section, it is at times advisable to use single-phase motors on these fans, even of as large as 1½ horsepower, and to operate these motors from the lighting circuits, as this permits the starting and stopping of the motor by means of a flush switch of the lock type, set in the wall adjacent to the location of the fan. As these motors are in reach of the pupils, there is then no danger from the higher motor voltage that may be used on the power circuits throughout the building. This also applies to the small motors used for the ventilation of vent hoods in the chemical laboratory or for special laboratory equipment.

All motors throughout the building, and not included under the electrical contract, should be furnished and set in position ready for wiring by the proper contractor. All controlling equipment, such as speed controllers, compensators or automatic starters should be included with the motors. The wiring contract should as a rule include the mounting in position of all such controllers, etc., as well as all wiring to and between the motors and controllers to make the work complete. In the event that slate backs or bases are not included with the controllers, and such controllers are to be mounted on or supported on wood or on plastered walls, the wiring contract should include the furnishing and installation of these slate bases as required by the code. The wiring contract should also include the furnishing and installation of a fused knife switch at each motor, this switch to be of the proper capacity to protect the motor.

With a motor voltage of 220 volts, a standard slate based open type knife switch may be used at the motors. For years, however, it has been the writer's practice to require that these switches and fuses be enclosed in steel cabinets, or to make use of any of the standard externally operated safety switches, as this makes a better installation and

does away with the danger of electric shock or burns due to accidental contact with the current-carrying parts of the switches and fuses. With the use of 550 volts, however, open switches should not be considered, but some type of 550-volt safety switch should be used at all motors; this is of importance, as aside from the question of good construction, or safety in the operation of the motors and equipment, the rules of different cities will arbitrarily require the installation of safety switches on this voltage.

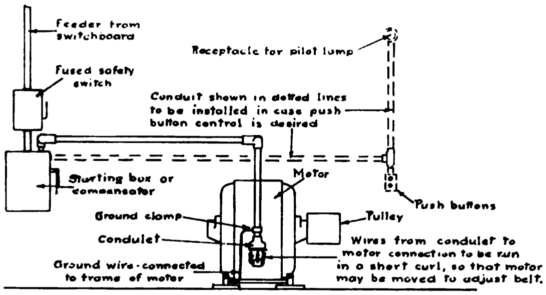


DIAGRAM SHOWING CONNECTION OF SAFETY SWITCH-COMPENSATOR AND MOTOR

In general, the construction at the motor should be "under iron," that is the feeding conduit should terminate in the steel box of the motor switch, conduits passing also between the switch and starter, or compensator, and from the starter to the motor. Where the starter is not of the enclosed type, the conduit may terminate in a condulet or similar fitting, the wires passing through holes in the porcelain cap of the fitting direct to the terminals. Where the motor is of the direct connected type, the conduits may be made up with a rigid connection to the motor, but where belted motors are used, the conduit must terminate in a condulet or similar fitting as just noted, the wires passing from the fitting in a curl to the terminals on the motor, sufficient length being left on the wires to permit the motor's being moved on the belt rails or base, to allow for the tightening of the belt.

In the mounting of speed controllers on fan motors, particularly where such motors and equipment are installed in connection with air-washers, the controller should be set up on the wall and not on the floor. It is further advisable that the conduits and wires from the switchboard to the controllers and from the controllers to the motors should be run "up and over" rather than under the floor, so as to avoid trouble on the circuits due to a ruptured water pipe or to some other accident to the air-washer equipment.

As ventilating equipment may be located on the roof or in attic space, as well as in the basement, and as this apparatus must be operated each day, the question of control should have consideration. The writer is not in favor of remote-control equipment for this work, since if the engineer or janitor must go to each fan in order to put it in operation, he can see that the oil wells are filled, the belts in place and the equipment in proper condition and running at the proper speed, while if this apparatus can be started and stopped from the engine room or other convenient point in the basement, the equipment is very likely to be neglected. If, however, it is desired to control this equipment from a remote point, automatic starters may be located at the motors with controlling push-buttons at points in the basement. Pilot lamps should be installed at the buttons, one to each motor, and so connected that the lamps will glow when the motors are in operation and be canceled when the motors are stopped. No. 14 wire only is required for the controlling circuit. With automatic starting and stopping of the fan equipment, a speed controller of the "pre-set type" is located at the motor, this being set to the speed required. The motor will then run at this speed, under control of the automatic starter; when the speed is to be changed, the engineer must go to the motor and readjust the speed to the desired point.

Another method is sometimes used, consisting of a standard speed controller at the motor, with an underload circuit-breaker connected also in the circuit, a master knife switch being located in the basement at some convenient point. This forces the engineer to go to the motor to start and adjust the speed, but the equipment may be stopped at night by opening the switch in the basement.

Where an elevator is to be used, the hoisting machine may be located on the basement floor, in the attic space, or in a penthouse on the roof. The hoisting equipment, including controller, automatic operating devices, wiring in the car, both for the operation of the car and the car lighting, etc., is included under the elevator contract. The wiring contract should include a separate circuit from the service switchboard to the hoisting machine, and this should terminate in a fused switch with an extension of the circuit from the switch to the location of the controller. All final connections of the circuit with the controller will be made by the elevator contractor. A branch circuit should be carried from one of the lighting panels to a point halfway up the well shaft, terminating in an outlet box at this point in readiness for connection to the flexible lighting cable from the car.

Where equipment is provided for industrial classrooms, such as printing rooms, machine shops, woodworking shops, sheet metal departments, etc., and motor-driven machines are to be used, an accurate layout of the rooms with locations of the machines should be obtained before the wiring plans are completed, as these machines will be grouped throughout the space and the feeding conduits must be run under the floor to the controllers and motors. It is of importance that each industrial department, whether of one or more classrooms, be separately controlled from a panel or switchboard, this kept under lock by the instructor, preventing the tools'

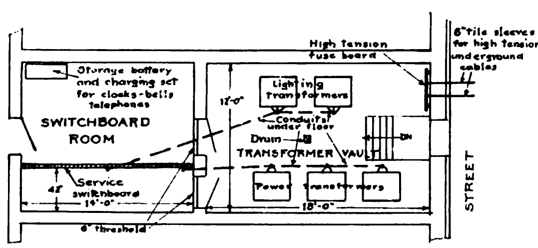
being used by the pupils during the instructor's absence. It is good practice to locate a power panelboard in a steel cabinet at some location convenient to the instructor's desk, this panel being of the standard type and containing fused switches for the control of the different circuits to the machine tools, the cabinet door being fitted with a lock. Where space is permitted but where the development of the industrial equipment is not determined, it is good practice to carry either an empty conduit or a power circuit from the service switchboard to the rooms in question and to terminate this conduit and circuit at a convenient point in the room, either at the ceiling or at a point about 4 feet from the floor, the conduit to be run concealed and terminating approximately 1 inch from the wall. The conduit should be capped and left in readiness for extension of the circuit. This provides a feeder circuit to the room, and the circuit may be extended in exposed conduits to the locations of the motors when the layout is determined. With the use of individual motors this of course means the later cutting of the floor or the installation of the conduits on the ceiling and dropping to the individual motors.

In running circuits from panelboards to the different tools the writer has found it advisable to use a single circuit for motors of 15 horsepower or larger; to use two or three motors of 10 horsepower each on a circuit: five or six motors of 3 horsepower each, and as high as ten or twelve motors of 1 horsepower each. The tools would of course be grouped on the circuits, depending on their types and locations. Thus a large planer would have a single circuit, while two or three small planers, four or five saws, four or five boring machines or drills, or ten to twelve lathes could be grouped on separate circuits from the panelboard. This method of circuiting keeps down the size of the copper and conduits in the floor slabs and provides a flexible equipment, since but few machines will be rendered inoperative by the opening of a fuse; it further permits the instructor to cut out any group of machines at will. The use of floor boxes should be avoided where possible in the installation of machine tools, and the conduit should bend up from the floor in an elbow, the conduit terminating in a fitting well above the floor. This not only provides a waterproof installation, but as the circuit wires are carried above the floor there is ample room to make proper splices and connections.

In proportioning copper for the motor circuits, the full load as well as the starting load must be provided for, and the copper must be heavy enough to take care of the maximum load in amperes. If the starting load on the motor, due to a long line of shafting, or pumps under pressure, is 25 per cent in excess of full load, the copper must be proportioned for the starting load; if, however, a number of motors are connected on one circuit, all of these motors will not start at the same instant, and the feeder copper therefore should be proportioned for the maximum load that may be expected at any one time. This is, as a rule, on general work from 60 to 80 per cent of the connected load of all the motors on the circuit. Where the circuits are long, additional copper must be provided to care for the drop in voltage due to the resistance of the circuits, etc. In school work, however, where all of the motors are located in one building and the runs are comparatively short, copper proportioned for the full load of the motors will be ample.

For direct current work, allow eight amperes per horsepower on motor circuits when operating at 110 volts, and four amperes per horsepower at 220 volts. For alternating current, three-phase circuits the table on the next page will be found of convenience.

Service Connections and Switchboard. With direct current the service cables will run directly from the street mains to the service switchboard, either underground or on poles. With alternating current service (with transformers installed on the street) the lines will be brought in as just described, there being as a rule one single-phase, three-wire service for lighting and a separate three-phase or two-phase service for power. On the larger school buildings it is generally preferred that a transformer vault be located at some point in the basement and transformers for both lighting and power installed in this vault. When this is done the primary service at 2,300 volts is carried into the vault, terminating in oil circuit-breakers, and passing from the breakers to the primary leads of the transformers. The wiring contract should provide for primary cables, usually No. 4 conductor, from the circuit-breakers to the property line, these installed in conduits or with armored cable. The cables from the property line to the primary mains of the service company are installed by the company. The transformers will be furnished and set in position by the company.



DETAIL SHOWING TRANSFORMER VAULT AND SWITCHBOARD ROOM

The transformer vault should be of fireproof construction and should have not less than 40 square feet of floor space for 100 K. V. A. transformer capacity, and it should be larger where transformers of greater capacity are to be used. The vault should have full headroom and should be vented to the outer air with not less than two 6-inch square ventilating ducts.

The service switchboard room should be adjacent to the vault, and it is good practice to arrange the board as shown on the diagram, with a door from

the vault to the rear of the board. This keeps all high tension connections in the vault or opening from the vault, and since the vault is kept locked, even the operator of the board cannot come in contact with the high tension terminals. One panel of the switchboard should be reserved for the watt-hour and demand meters of the service company; the drilling for these meters is to be done from templates furnished by the company. The switchboard should be made up in two sections, one for power and one for lighting service, each fitted with a master switch, and the two service mains running from these service switches to the transformers.

Each feeder from the switchboard to the panelboards, motors, etc., should be mastered from fused switches on the switchboard, the switch and fuses being of the full capacity of the feeder. There should be a separate feeder from the board to the stage panel and lobby panel of the assembly hall, also a separate emergency feeder to the lobby panel controlling the exit and emergency lighting.

There should also be a separate feeder to the panel controlling the lighting of the gymnasium, and separate feeders to the different groups of panels controlling the lighting circuit throughout the corridors. As a rule the corridor panels are grouped on four risers, one at each corner of the building, thus controlling four sections of the building on separate risers.

On the power circuits there should be a separate riser controlling the ventilating equipment in the basement, and also separate risers to such ventilating equipment as may be installed on the roof, to the motors in the industrial departments, the elevator, the motor generator set for the moving picture booth, and the motor-driven equipment in the boiler room.

All switches on the lighting panels of the switchboard may be of the standard open type, the same type being used for the power circuits on 220-volt work. With 550-volt work, however, it is advisable to use back connected oil circuit-breakers on the power panels of the service switchboard.

Recording and indicating instruments are not as a rule used on these switchboards; if it is desired to keep records of the loads and distribution of the current, instruments may be installed on this board and connected in the feeder circuits. These may be of the indicating, recording or chart type as desired.

Riser circuits should be run from the switchboard to the panels of the lighting circuits, and where there is more than one panel connected to the riser the riser should pass through the panels connecting in series, full sized copper being used, for if the copper is reduced from panel to panel it becomes necessary to make use of fuses to protect the smaller conductors, and the cost of the fuses and connections becomes more on these short runs than the cost of the full sized copper.

Riser circuits should be proportioned on three-

TABLE FOR PROPORTIONING COPPER IN MOTOR CIRCUITS WITH ALTERNATING CURRENTS

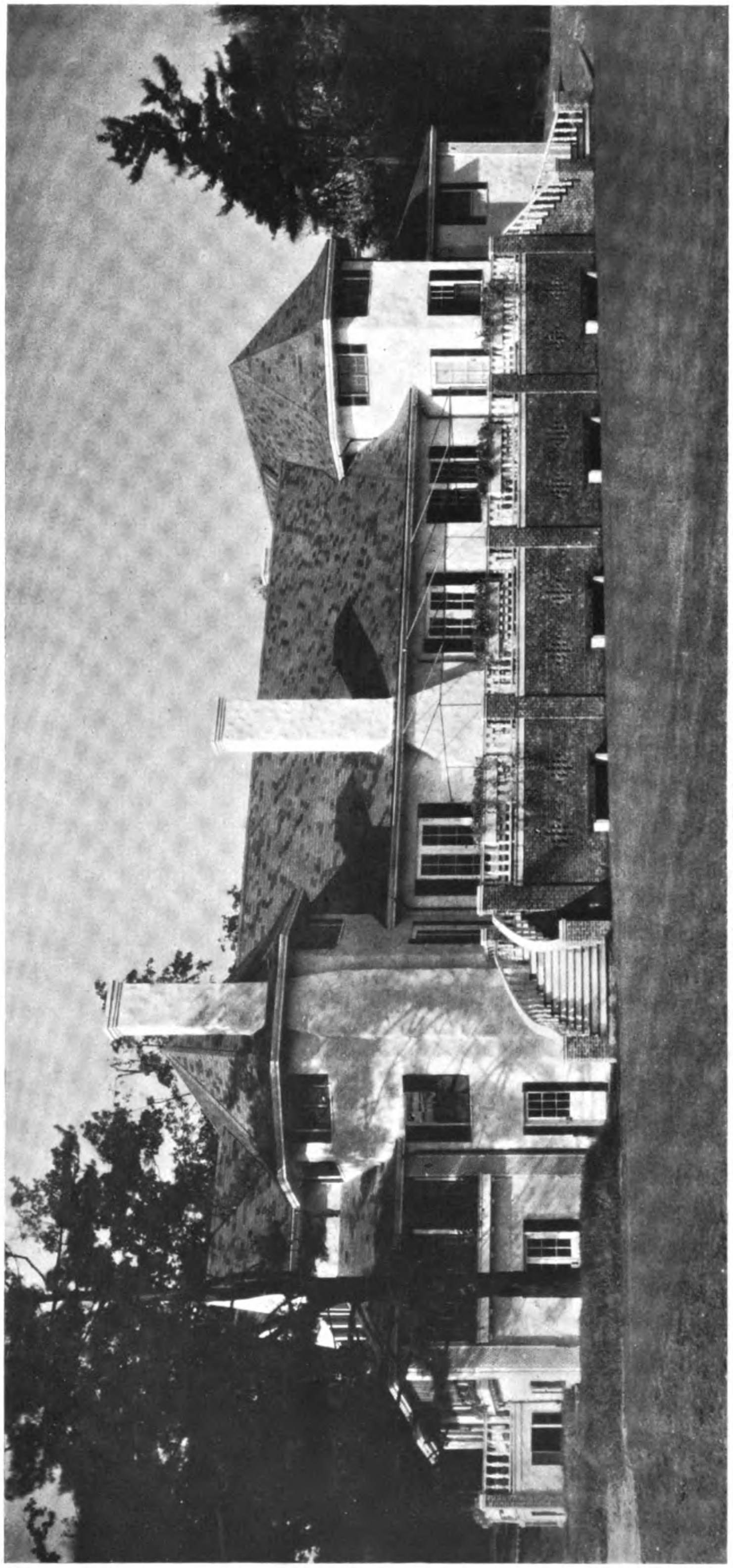
H.P.	Approx. full load current in amperes	Amperes of starting fuses	Amperes of running fuses	Amperes of switch	Size of wire
110-volt circuits					
1	6	15	10	30	No. 14
2	12	25	20	30	12
3	18	35	25	30	8
5	30	60	40	60	6
7½	42	80	60	100	4
10	56	100	75	100	2
15	84	150	125	200	0
20	104	200	150	200	00
30	156	250	200	200	300,000 C.M.
220-volt circuits					
1	3	10	6	30	No. 14
2	6	15	10	30	14
3	9	20	15	30	12
5	15	30	20	30	10
7½	21	40	30	60	8
10	28	60	40	60	6
15	42	80	60	100	4
20	52	100	75	100	2
30	78	150	125	200	0

wire, 220-volt circuits for 4.7 amperes per kw. connected load, three wires of the same size being used for each riser circuit.

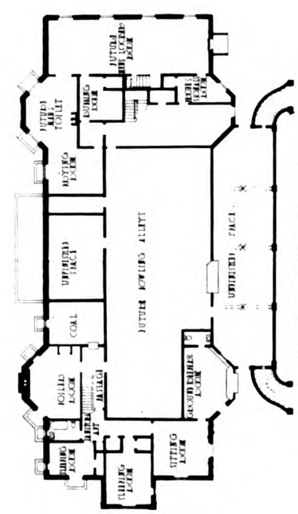
In certain districts a three-wire, 110-220-volt lighting service may not be available, in which case all feeder circuits are developed on a 110-volt, two-wire system. These feeders must be proportioned for 10 amperes per kw. connected load, and the copper should be sized for approximately 80 per cent of the total connected lighting load of the building. Two wires are used (of the same size) for all feeder circuits.

Conduits containing the feeder circuits should be run exposed on the ceiling of the basement corridors or concealed in the first floor slab, rather than under the floor, in order to avoid pockets that may contain moisture. As a rule, these conduits may be run in the duct spaces in the basement corridors, either at the sides of the heat and vent ducts, or in the galvanized iron vent ducts, passing out through the sides of the ducts at the panelboards.

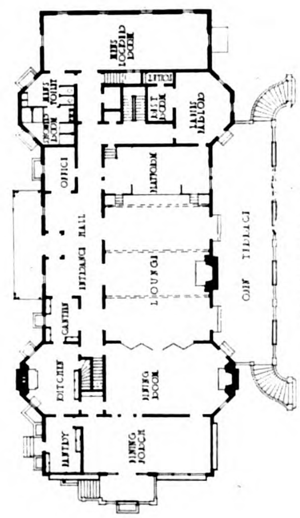
Where, due to building construction, it becomes advisable to install the feeder conduits under the floor of the basement, and where there is any liability of there being moisture, the feeder circuits should be sheathed with lead in addition to the regular rubber insulation. A steel junction or splicing box must be used at the point where the leaded wires connect with the riser circuits, this located in an accessible location in the basement corridor, unless the construction permits the leaded wires to be carried into the cabinet of the first panelboard without splices, in which case the lead may be laid back and the wires connected direct to the terminals of the buss bars of the first panelboard.



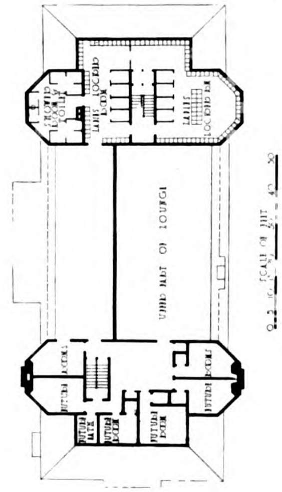
GENERAL VIEW FROM TENNIS COURTS



BASEMENT FLOOR PLAN



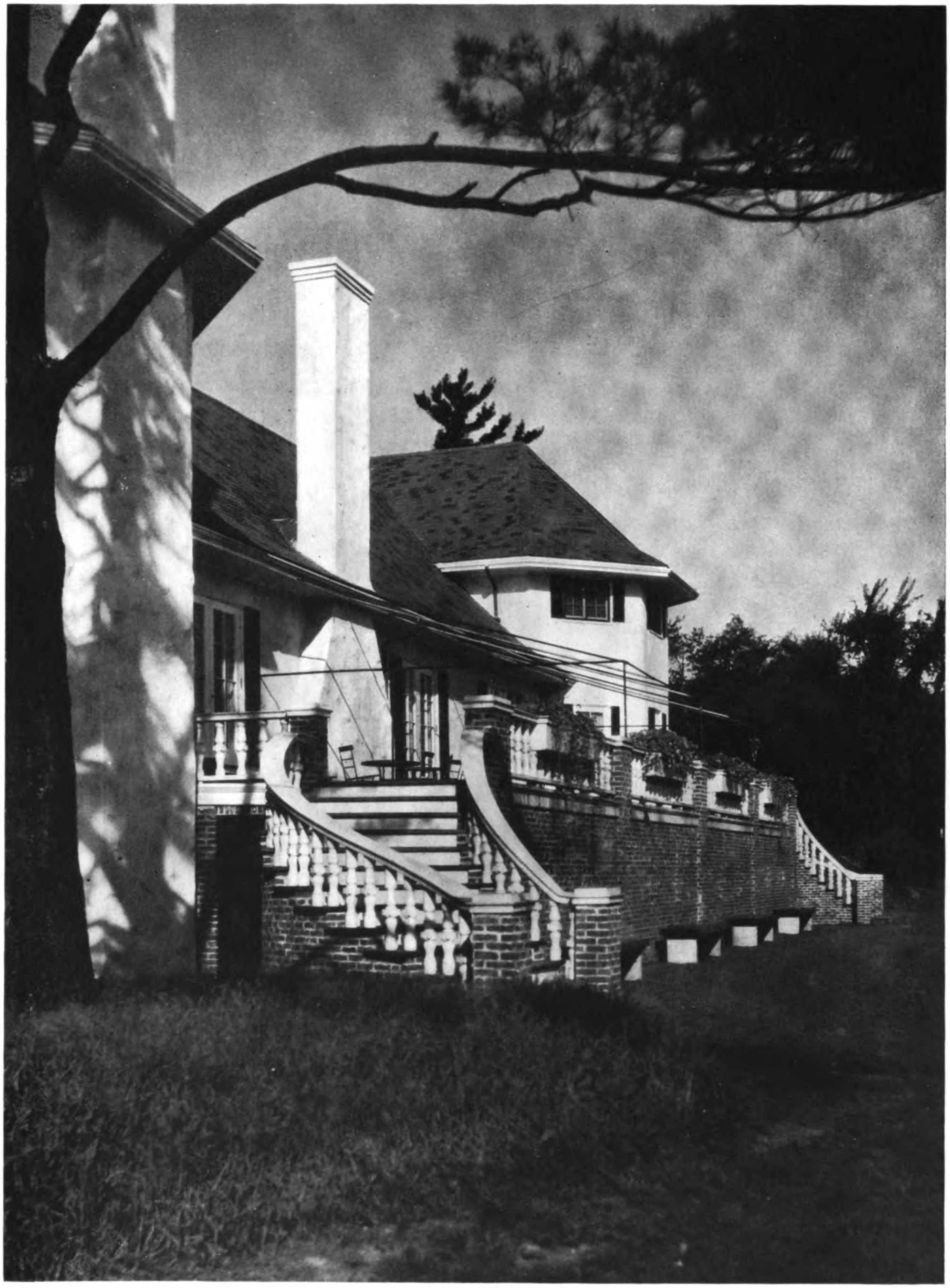
FIRST FLOOR PLAN



SECOND FLOOR PLAN

LONGWOOD CRICKET CLUB, CHESTNUT HILL, MASS.

PUTNAM & COX, ARCHITECTS

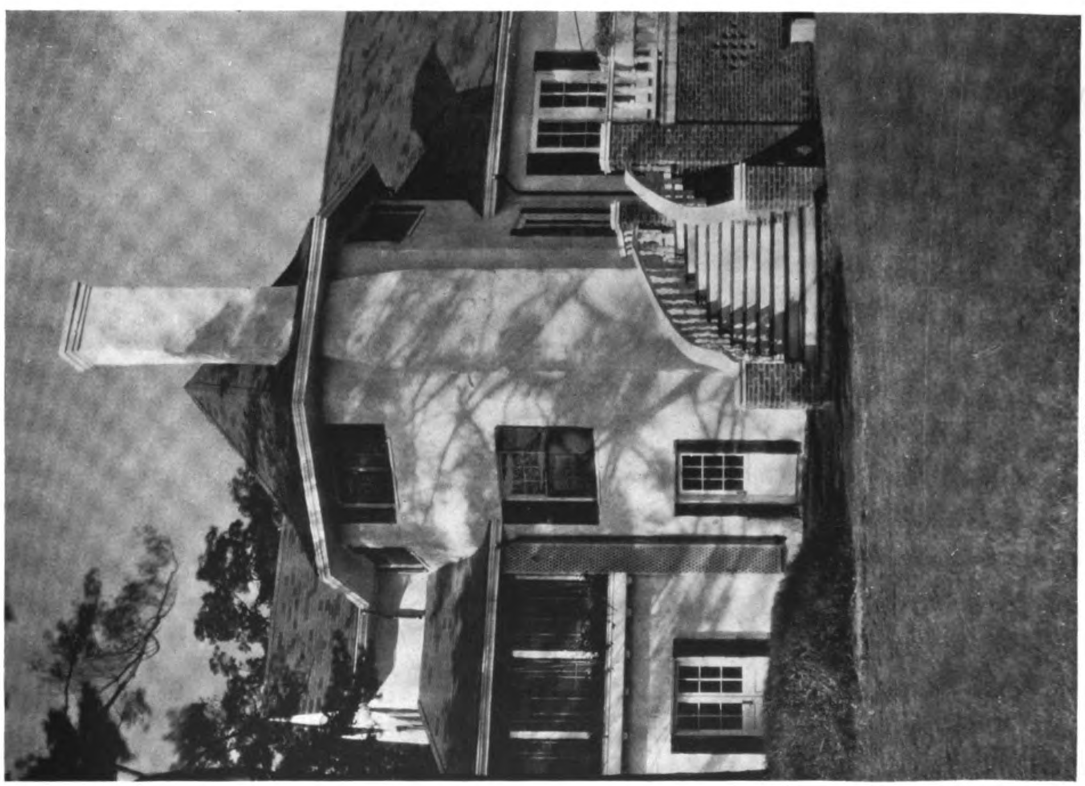


DETAIL OF COURT SIDE

LONGWOOD CRICKET CLUB, CHESTNUT HILL, MASS.

PUTNAM & COX, ARCHITECTS

ENTRANCE FRONT



DETAIL OF BAY

LONGWOOD CRICKET CLUB, CHESTNUT HILL, MASS.

PUTNAM & COX, ARCHITECTS

DINING AND CARD ROOM

LOUNGE ROOM

LONGWOOD CRICKET CLUB, CHESTNUT HILL, MASS.

PUTNAM & COX, ARCHITECTS

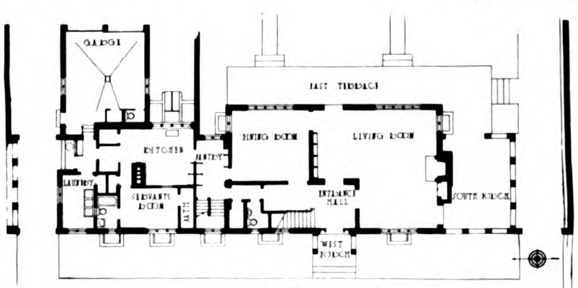
VIEW OF ENTRANCE FRONT

VIEW FROM THE GARDEN

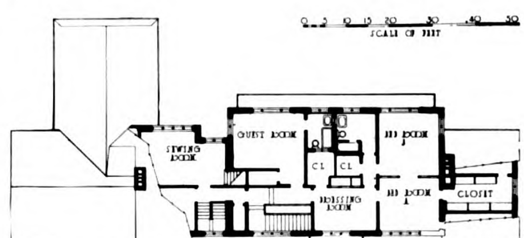
HOUSE OF ARTHUR S. PARKS, ESQ., WICHITA, KAN.

MYRON HUNT, ARCHITECT

DETAIL OF ENTRANCE



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HOUSE OF ARTHUR S. PARKS, ESQ., WICHITA, KAN.

MYRON HUNT, ARCHITECT

Concrete Construction

V. CONCRETE IN THE OFFICE

By WALTER W. CLIFFORD, *of Clifford & Roeblad, Engineers*

DESIGN computations, drawings, and specifications comprise the office end of concrete construction. Like the field work, they vary somewhat in practice from other departments of building work.

System in design computations for concrete is of great importance, because practically every concrete member requires as many computations as a steel plate girder. In a concrete beam, for example, the exterior moment must ordinarily be computed at points of positive and negative moment and often at other points to locate the cambers; the shear must be computed at several points in order to space the stirrups, and the rods must be selected for suitable combinations, top and bottom, and for compression steel at the support. After the solution is reached, it cannot be expressed to the draftsman by a simple reference to a standard section, but must be shown in a sketch or the information must be tabulated. Furthermore, grades of material and allowable stresses are not standardized in concrete, and to facilitate a review of computations or later reference thereto, clear presentation of fundamental data is essential. All this work may be done with the utmost neatness, yet if it is arranged in a haphazard manner it will be a tedious process to find all the desired information, and the possibility of there being omitted data is great.

Systematic computations are most easily made by the aid of a printed form. Such a form is a real economy for all offices where design computations are made regularly, and a necessity in offices where computations are likely to be used by several men. In the small offices where one man makes design, drawings and specifications, a form is less important, but even there it is needful to have the data clearly arranged for future reference, and a simple office computation sheet with a heading which has blanks for loadings and unit stresses is worth while.

Design sheets are usually made letter size, and it assists most of us in our striving for neatness in computations to have the sheet quadrilled. In the heading at the top of the sheet, besides the firm name, there are usually blank spaces for the job's name or number, the initials of the designer and the checker, the date, the sheet number, a blank line for "Remarks," such as "Scheme A" or "Four-story design," and a space for the subject of the computation. Next in order of sequence and position comes a tabulation of the data. Space is allowed for "fc" (allowable compression in the concrete), "fs" (allowable tension in the steel), "n" (ratio of the moduli of elasticity), "v" (allowable shear), and "u" (allowable bond stress), and sometimes "R" (coefficient of resistance) and "p" (percentage of steel) if these are customarily used. For the small offices, where it is desirable to use one computation form for all classes of work, such a sheet is sufficient. It can be used for wood, steel or concrete, and the results can be shown by a sketch or notation at the bottom of the sheet.

Where sufficient work is done to warrant separate design forms for beams, columns, and miscellaneous members, more can be advantageously added to the form. On beam sheets there should be added to the data blanks spaces for the live load, various parts of the dead load, and the panel width. The center-to-center span and clear span should also be included, unless they are already accounted for in a printed design sketch. In the body of the sheet printed forms for the various routine computations, such as "M = ———— = ft. lbs." may be included at the option of the individual. Finally comes the statement of the results which may be in tabular form, in a sketch or by a combination of the two methods. Probably the most satisfactory method is to have a sketch similar to that shown in Fig. 1. The rods as used can be quickly drawn in over the dotted template lines; intersecting beams can be shown (and dimensioned on the top dimension line), and the sketch used as a load diagram. As actually used the sketch shown is made the full width of the computation paper. Even so, it is rather small to take all the stirrup dimensions, and they can be easily shown in tabular form as:

"Stirrup spacing from the face of left support ...."

"Stirrup spacing from the face of right support ...."

For columns a different type of sheet is needed, and something like that shown in part in Fig. 2 is very satisfactory. Concrete members, aside from beams and columns, vary so greatly that the simple sheet with heading and blank spaces for stresses is most satisfactory, although some offices have special forms for footing design.

To many who have not used them, design forms may seem a needless expense, but aside from the saving in time by having desired information quickly available and insuring against omissions, printing is immensely cheaper than handwork, and the money saved in printing the regularly used words and lines is large.

After computations come drawings. Concrete drawings are of two kinds,—assembly drawings and details. Owing to lack of standardization and other considerations mentioned in a previous article on design, concrete cannot be turned over to the contractor to detail as can structural steel. The assembly drawings for concrete work are largely the fram-

ing plans. They show the locations and sizes of columns and beams as well as of openings, and the identification numbers of beams and columns. It is usually practicable to use the framing plan for a slab detail sheet, supplementing it as may be necessary with sections. The bending diagram of slab rods can often be shown directly on the framing plan, thereby saving in large part the drawing of sections. Framing plans are usually drawn at a scale of ⅛ inch or ¼ inch to the foot.

Concrete details should be drawn after the custom of structural steel details rather than by architectural conventions; that is to say each member,—beam or column,—should be considered as a unit and so detailed. The method of taking various and sundry sections through the building and detailing thereon such members as may be visible or nearly visible is not a satisfactory method. Up to the present, at least, concrete details are usually made to scale rather than on template diagrams such as are used so advantageously in steel detailing.

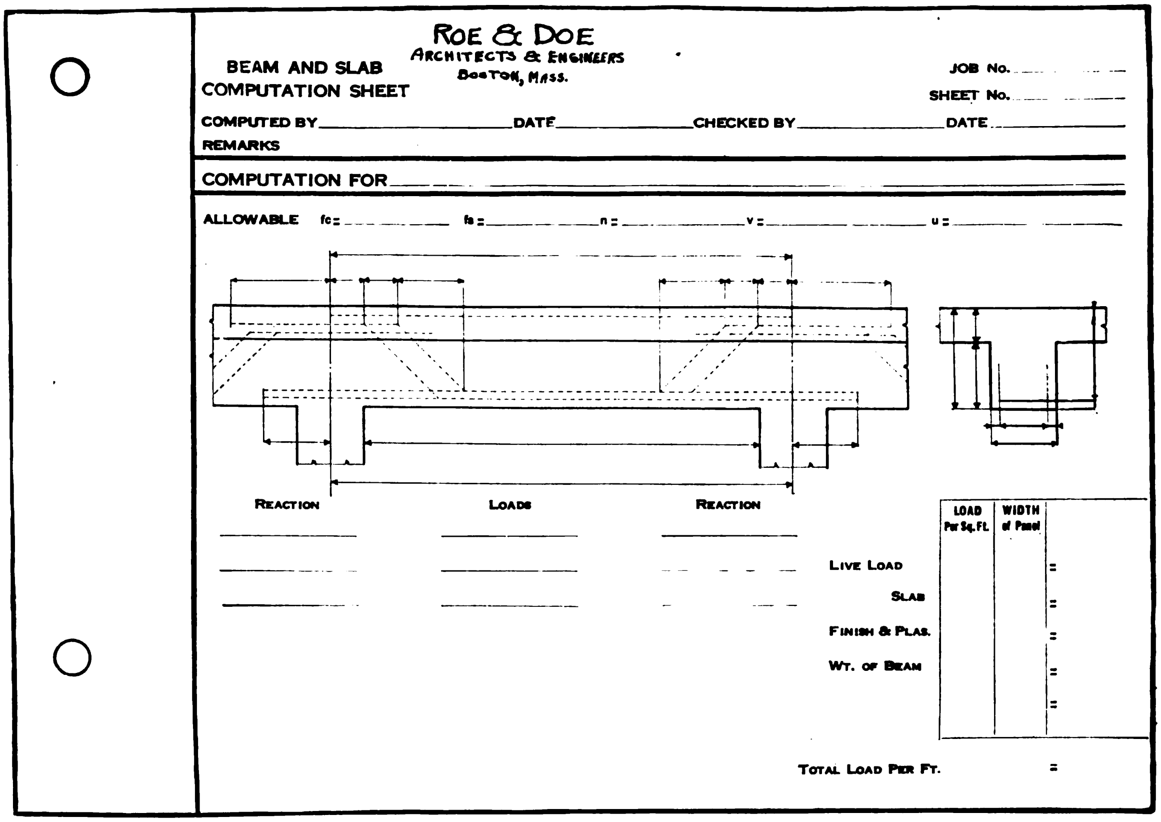
There are some common conventions and customs which make for speed and economy in concrete detailing. The scale of ½ inch to the foot has been found the most satisfactory for concrete details and is almost universally used in the larger organizations. A convention not so universally used as it should be is the use of full heavy lines to indicate reinforcement. The more or less prevalent use of dotted lines for this purpose is probably based upon the idea that concrete reinforcement should be "invisible" since it is back of the surface. The dotted line has actually nothing to recommend it for showing main steel, although it may be effectively used to distinguish the ends of rods belonging to another member but projecting into that being detailed, as shown in Fig. 3. The full line can be drawn more quickly than the dotted line, and where rods cross the latter often leads to ambiguity. Weight of line offers plenty of opportunity for distinction. On framing plans, beams are often shown as heavy single lines, rods as full lines of medium weight, and outlines by a light full line, all being as clear and distinct as they could possibly be if dotted lines were used, and the whole drawing is clearer and more easily read. Another old convention which can be readily improved upon is the use of triangles and dots to indicate concrete in section. This is very interesting when well done, but shading on the back of the tracing with a soft pencil is fully as satisfactory and is much more quickly made. Still another convention—it might almost be called a principle—of concrete detailing is that clear diagraming of reinforcement is much more important than correct orthographic projection; for example, in the elevation of a beam at supports, rods should be separated on the drawing as may be necessary to indicate clearly the outline of each rod, even if they are actually in the same plane. The section and dimensions will locate them in the proper planes.

It is probably better to leave the rod type numbers to the contractor and there is, of course, no need for the architect's giving schedules or complete bending diagrams. The designer must, however, give identification numbers or marks to the beams and columns for his own reference. For this purpose, the co-ordinate system as described in the "Handbook of Building Construction" has many advantages over the old system of consecutive numbering. The details of information which the architect should give, and must give if he is to justify himself as the designer of his work, are the sizes and locations of all main reinforcement, together with the angles and locations of all cambers and bends, and the size, shape and location or spacing of all secondary reinforcement such as stirrups, hoops or spacers. In general, the designer should give such information that the detail bending diagrams and schedules can be made only one way, and then check them to see that they are made in that one way. Certain of the information about auxiliary reinforcing, such as spacer rods in slabs and beams, stirrups where uniformly spaced, column hoops, amount of cover over main reinforcement, number of reinforcing chairs or supports and the lap of column rods, can be covered by suitable notes on the drawings or in the specifications.

The specification is the final item of concrete work in the office. To this chapter of the specification, as well as to the rest, should be applied the three Cs—clearness, completeness, and conciseness. Concrete specifications of the architect are to a considerable degree amenable to standardization. By this it is not meant that concrete chapters can be printed and inserted bodily in the individual specification with merely a glance at the heading, as can be done with the specifications of certain patented articles, nor is it possible to make much headway with a specification for all kinds of concrete work for all parts of the country. But a standard specification can be written for a certain class of building work in a given locality which will, by suitable deletions and such minor descriptive items as pertain specifically to the individual job, answer for the greater part of the work of any one office, and also be a helpful guide in the exceptional cases. Such a specification should contain many sidenotes suggestive of conditions under which certain omissions or additions should be made and should suggest necessary cross references to "Allowances" and other chapters. This standard can be used in two ways: first, by having a single copy and using it as a guide for dictating and, second, by having the standard mimeographed and marking one sheet up as needed for stenographic copy.

Here is a satisfactory outline of such a chapter for ordinary building work:

A. Extent of Work and Estimates
1. Extent of work.
2. Division of estimate.
3. Alternate estimates.
4. Unit prices.


ROE & DOE
ARCHITECTS & ENGINEERS
BOSTON, MASS.
BEAM AND SLAB
COMPUTATION SHEET
JOB No.
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COMPUTED BY
DATE
CHECKED BY
DATE
REMARKS
COMPUTATION FOR
ALLOWABLE fc= fs= n= v= u=
REACTION
LOADS
REACTION
LOAD Per Sq. Ft.
WIDTH of Panel
LIVE LOAD
SLAB
FINISH & PLAS.
WT. OF BEAM
TOTAL LOAD PER FT.

Fig. 1

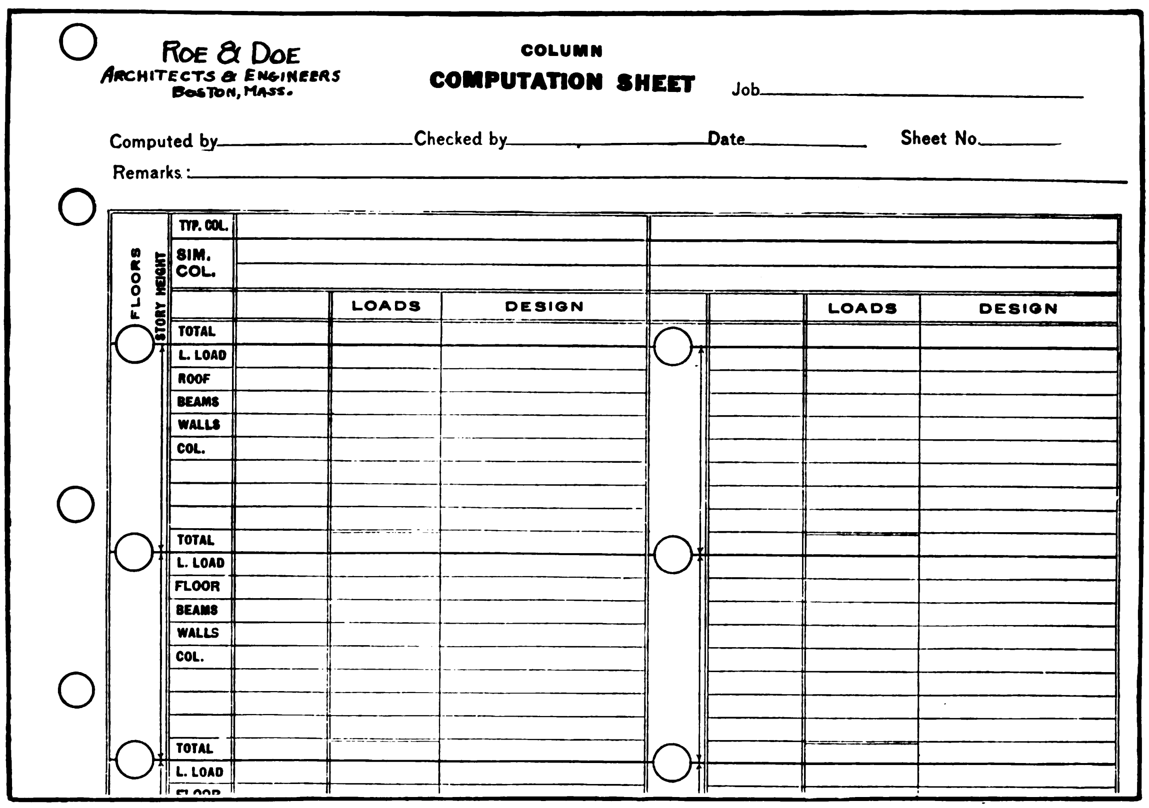

ROE & DOE
ARCHITECTS & ENGINEERS
BOSTON, MASS.
COLUMN
COMPUTATION SHEET
Job
Computed by
Checked by
Date
Sheet No.
Remarks :
TYP. COL.
SIM. COL.
FLOORS
STORY HEIGHT
LOADS
DESIGN
LOADS
DESIGN
TOTAL
L. LOAD
ROOF
BEAMS
WALLS
COL.
TOTAL
L. LOAD
FLOOR
BEAMS
WALLS
COL.
TOTAL
L. LOAD

Fig. 2

B. Materials
1. Cement.
2. Sand.
3. Coarse aggregate.
4. Cinders.
5. Water.
6. Reinforcement.
7. Waterproofing materials.
8. Hydrated lime.

C. Workmanship
1. Forms.
2. Bending and placing reinforcement.
3. Proportioning concrete.
4. Mixing concrete.
5. Placing concrete.
6. Construction joints.
7. Cold weather protection.

D. Details of Construction
1. Granolithic floor finish.
2. Cinder concrete.
3. Roof crickets.
4. Holes for pipes, etc.
5. Rubble concrete.
6. Surface treatment.
7. Special details.

In division "A" the section on extent of work is of course different for each case. Sometimes, when the work is largely concrete, the general description at the beginning of the specification covers this point sufficiently. Sections 2, 3 and 4 of this division are governed by the customs of the individual office in letting work as well as by the conditions of the specific instance. They can be arranged in any case so that it will be necessary only to fill in a few words under each item if they are needed.

In division "B,"—"Materials,"—"Cement," "Lime" and "Reinforcement" can be covered as regards quality by reference to the standard specifications of the American Society for Testing Materials. It must be noted under reinforcement, however, that there are several possible alternatives. All should be covered in the standard, and those not needed deleted from the individual specification. The quality of sand, coarse aggregates, cinders and water can be covered by standard paragraphs for any given section of the country. The sizes of the coarse aggregates can be left to "Proportioning Concrete" in division C. Occasionally special paragraphs will be needed on aggregates required for ornamental surface treatment. In the standard specification this can be taken care of by suitable sidenotes. Waterproofing materials can be covered by standard paragraphs for the great majority of cases, since the accepted types of waterproofing materials are few in number.

Under division C,—"Workmanship,"—"Forms," "Bending and Placing Reinforcement," "Mixing Concrete," "Placing Concrete," and "Construction Joints" can all be covered by standard paragraphs and adapted to the individual piece of work by suitable deletions. The section on proportioning concrete can be similarly handled by the use of a table of mixtures from which such are used and referred to as needed in the individual case. The section on "Cold Weather Protection" will be used or omitted as a whole. For the benefit of the entire building industry it is to be hoped that there will be increasing need for its use. The Portland Cement Association publishes a pamphlet which gives excellent material for this section.

In division D, brief standard sections will cover "Cinder Concrete," "Roof Crickets," "Holes for Pipes, etc.," and "Rubble Concrete." "Granolithic Finish" has several possibilities from which to choose, and this is the case to an even greater extent in the matter of "Surface Treatment." The writing of these sections will be greatly facilitated by reference to the "Proceedings of the American Concrete Institute" for the last year or two. The section "Special Details" is the catchall for minor special features which will occasionally crop up. With complete drawings it is not often needed.

But the arts and sciences are moving forward, and the best of standards must be frequently revised. The "Tentative Specifications for Concrete and Reinforced Concrete of the Joint Committee of Engineering Societies," issued about a year ago, suggests many changes in practice which may occur in the next few years. While it is not at present in such shape as to be of very definite help, it should be read by every writer of specifications.

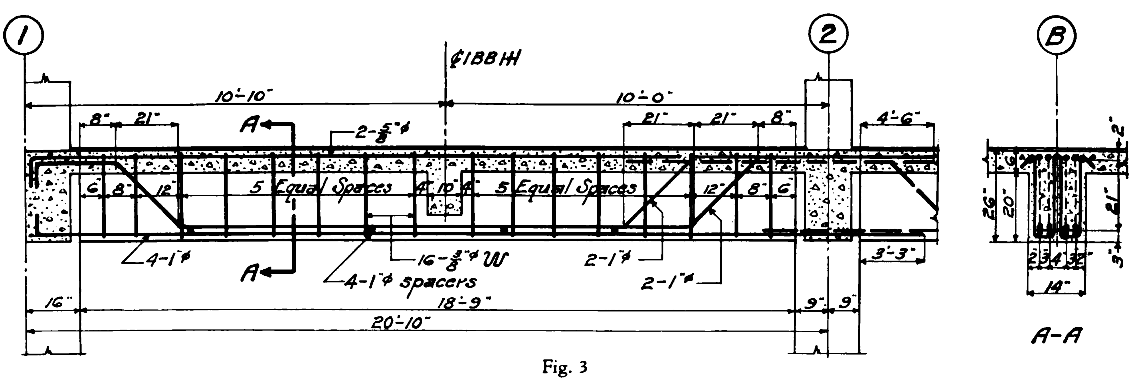


Fig. 3

Plate Description

House of Mrs. William Hayward, 1051 Fifth avenue, New York. Plates 73–80. Situated at the corner of Fifth avenue and 86th street and facing Central Park this residence is one of the most important individual dwellings erected in New York during recent years. Designed by Guy Lowell in the style of the Italian renaissance, the house is built entirely of pink Tennessee marble, while a balustrade of bronze is placed above the cornice.

The plan of the interior provides rooms of unusual size and height. From the vestibule one enters the lower hall from which the dining room opens at the right, while at the left and facing Fifth avenue are two reception rooms, and just ahead is the stair hall of elliptical form in which the balanced stairway leads to the main floor. Upon this floor the entire avenue side of the house is taken up by the drawing room which is connected by a long gallery facing 86th street with the library, while still beyond is a billiard room. The ceilings of the first floor are 15 feet and those of the second or main floor 18 feet, 6 inches in height.

The interior of the house fulfills the promise made by its rich and dignified exterior. Several of the rooms are fitted with antique paneling and other woodwork taken from old buildings in France and England, and the furnishings of the house are largely antiques, with many treasures of paintings, tapestries and oriental porcelain.

Co-operative Apartment House, 136 East 67th street, New York. Plates 81, 82. This structure is the latest of several co-operative apartment buildings in the neighborhood centering at 67th street and Lexington avenue, but it has not the height which often characterizes New York apartment houses, being but approximately one-half that of the adjoining structure shown in one of the plates. Owing to the ample area of the plot it has been possible to give all the apartments excellent light and air, for as viewed from the street the building is arranged somewhat in courtyard fashion, while at the rear which is toward the south the structure is planned with a deep court.

Walker & Gillette, the architects of the building, have planned the exterior in the Spanish style with stuccoed walls and with tiles used upon the roofs, the parapet and even upon certain of the chimneys, while balconies of wrought iron of simple patterns are placed at certain of the windows to give accent and variety to the stuccoed facade. The building gains an added Spanish character by the recessing of the upper story some distance from the roof cornice and the covering of this story with a low pitched tile roof of its own.

Longwood Cricket Club, Chestnut Hill, Mass. Plates 83–86. Judicious alterations and additions have transformed an old and obsolete building into this well planned and attractive clubhouse. The operations involved the moving of the original structure to a new site, the addition of a new wing, considerable altering of the interior and correction of many architectural shortcomings in the way of faulty lines and excess ornament.

The present building, of which Putnam & Cox are the architects, is planned with two fronts, the entrance front near which are arranged the offices and rooms for the reception of guests, and another front which overlooks the tennis courts. The arrangement of the main floor makes excellent provision for the uses of a club of somewhat broad scope and provides a lounging room of generous size and two full stories in height. At one end is a stage or platform, useful for many purposes, while at either side of a great fireplace French windows open upon a broad terrace which is placed at a considerable elevation above the grounds. At the end opposite the stage doors lead from the lounge into the club's dining room, while still beyond is an out of door dining room, both these departments being served from one kitchen and pantry.

The exterior presents an appearance wholly different from that of the original building. After the various changes were made, the shingled walls of the old structure as well as the walls of the newer portions were covered with metal lath upon which cream colored stucco of a slightly rough cast was applied. The chimneys were also stuccoed, the roofs covered with slate of varied colors, and the blinds painted dark green. The terrace upon which the lounge opens is supported by a brick wall, and about the terrace is a wood balustrade painted white to match the rest of the exterior trim.

House of Arthur S. Parks, Esq., Wichita, Kan. Plates 87, 88. In the exterior lines of this residence there is much to suggest the types associated with the early Spanish buildings in the west and southwest; the broad horizontal roof lines, emphasized by the overhanging veranda or balcony across the front, recall distinctly similar planning in old buildings in southern California, while the Spanish feeling is strengthened by the grouping of all the necessary structures under what is practically one roof, and the wooden gateway leading to the service quarters and garage. The materials used, however, are brick for the exterior walls and shingles for the roofs, materials which do not lend themselves to carrying out the Spanish type suggested by the design of the building, though presenting a pleasing appearance, particularly since the house stands surrounded by grounds which are well planned and are being well developed.

The architect, Myron Hunt, has provided a plan adapted to the spirit of the exterior—large rooms arranged in somewhat informal fashion, the large living room opening at one side upon a covered porch and at another side upon a broad terrace.

EDITORIAL COMMENT

ARCHITECTURAL EDUCATION AND THE PROFESSION

THE progress of architectural education in the United States, though extending over a comparatively brief period of time, has in general kept pace with the demands of the profession. As in the case of many other American activities we have chosen features from European precedents, adapting them to fit our special needs and conditions. Thus we were first influenced by the thorough training in the so-called practical subjects that resulted from the English system of pupilage; this produced the first architectural courses as a part of engineering study in our large technical schools. Later we were influenced by the work of the Ecole des Beaux-Arts in Paris, and with the accession of French masters and the return of many American students trained in the methods of the Ecole the pendulum swung to the opposite extreme, and a worship of the "style" sponsored by modern French architects drew attention away from construction and focused it on axes of plan and elaborate conception of elevation, which translated into brick and stone many of the Grand Prix projects that presented such beautiful studies on paper.

These two extremes afforded opportunity for study of educational methods, and we now enjoy the benefits of a system that is a compromise between them and quite typically American. That the ideal in architectural education has not been reached is, however, evident from the detailed discussion the topic always provokes at conventions of the American Institute of Architects. The problem is made complicated by the fact that architecture is both a science and an art, each phase demanding distinctly different teaching methods; the teaching of science consists of putting before the pupil facts which he is to store and later use as facts; in art, the facts are placed before the pupil, but for him to digest and reproduce in his own form. The problem is to secure a proper balance between the two, and the schools complain that the profession is not a unit in voicing its opinion as to the respective importance of these divergent requirements. The present system of education has done remarkably well under this handicap, but recent tendencies would indicate that instead of bringing the æsthetic and constructive sides of architecture together, they are being developed separately.

We have seen the manifestation of this possibility in practice within the past few years. The danger is that architecture will cease to have a definite function. We cannot deny that the engineer can construct without an architect, that the builder can build, and that the decorator can decorate without an architect. The architect's province and logical function are to direct the efforts of these various specialists, and through the medium of his general solution of a building problem produce a structure that meets definite requirements. He must have a broad understanding of the architect's real function; he must have a knowledge of modern methods and materials that will organically connect him with modern building. Disproportionate emphasis on pure design and too close study of building methods and instincts of the past will develop only academic knowledge. These problems are first met in actual practice; it is, therefore, from this experience that the requirements for successful training must be relayed to the schools. This means co-operation between the profession and the schools, and this element is too often lacking.

A definite example of one way to accomplish this co-operation is shown by the architects of Boston. Boston has always been favored in architectural education by the presence of the two schools of architecture at the Massachusetts Institute of Technology and at Harvard University. An enterprising atelier has also been conducted at the Boston Architectural Club, for the younger men working in the offices, and the atelier and the schools in past years have frequently collaborated on design problems to mutual advantage.

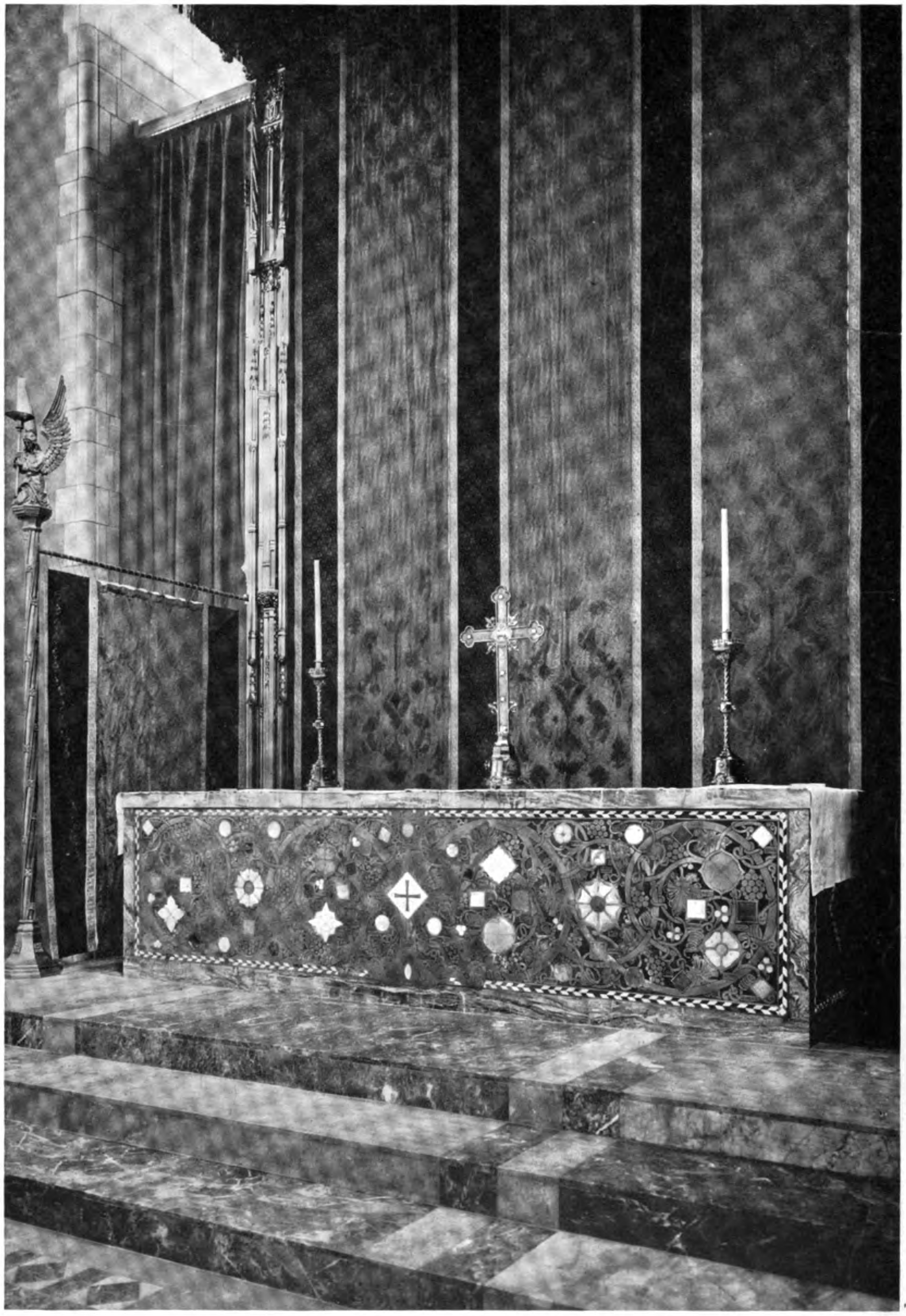
These facilities have served well for the younger student, but there has been no opportunity of giving the students the benefit of association with older men, nor has there been enough opportunity for the man past student age to profit from teaching as it is worked out in the great French schools.

The Committee of Education of the Boston Society of Architects has now arranged with the two professional schools for a revision of schedules that will permit students to continue their relations with their parent schools for the years immediately following their graduation. To encourage this movement back to the schools, the Boston Society of Architects has announced, as part of its annual competition, a prize of $150 "to go to the best project presented by a regular or special student at Harvard, Technology, or the Boston Architectural Club, or to any former student (not necessarily a graduate) who has been out of school for not more than five years. All projects must be done at one of the three schools."

Many of the Boston offices have agreed to permit their draftsmen to participate from time to time in this work, and the results are expected not only to strengthen the men who take up the opportunity, but to strengthen the schools as well.

DECORATION
and
FURNITURE

A DEPARTMENT
DEVOTED TO THE VARIED
PROFESSIONAL & DESIGN INTERESTS
WITH SPECIAL REFERENCE TO
AVAILABLE MATERIALS



AN ALTAR TREATMENT WITH AMERICAN FABRICS
EXHIBITING MASTERLY SCALE
BERTRAM GROSVENOR GOODHUE, ARCHITECT

A Plea for the Architect's Interest in Textile Fabrics

III. FABRICS AVAILABLE IN SHOPS TODAY

By HORACE MORAN, *Interior Decorator*

THE patrician of early Greek and Eastern civilization and his counterpart down to the nineteenth century were the only secular patrons of the textile arts in the past. The religious organizations were the other important factor in their encouragement. It was this and the possession of only the hand loom which have resulted in the production of all the great forms of woven material which have yielded to us such a wealth of decorative fabric documents, the source of inspiration for these days of quantity production. Since the introduction of the power loom the producers have been well occupied in applying this inheritance to modern needs, both by reproducing the costly weaves and adapting their designs to the more common materials.

The simplicity of democracy, perhaps somewhat of a pose in matters æsthetic, has given rise to a great variety of simple textiles, not affecting the costly weaves, but made to look the modest rôle they play and adapted to the modest homes they would grace. It is worthy of note that the Greeks of the classic period boasted just such simplicity in their fabrics, particularly for garments, which were purged of the florid and resplendent design of their Eastern neighbors. This reverting to the simple with us is a natural reaction following a period of debauchery in design, during which the gorgeous and pretentious ruled, regardless of real æsthetic merit. We are now treading more cautiously the field of design, and with the encouragement of the architect and the cultured client we may forget our upholstered past and use the art of the weaver to cheer interiors and not to smother them.

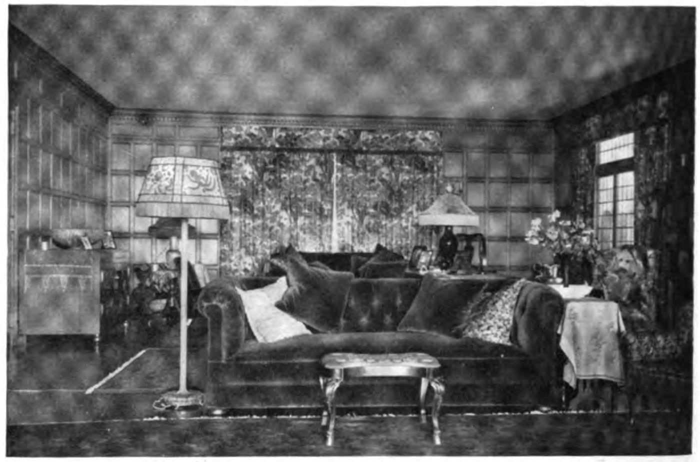
In this train of thought, one is tempted to consider the trend of interior design in general, so closely are the decorative fabrics related to the subject. Just one thought in this direction. The home decorated with elements so simple that the interior effect is grasped at a glance is devoid of interest, is created without imagination, and shows the influence of the thousand and one magazine articles on "how to decorate the home"; it looks like the show-

A Splendid Use of Tapestry on Furniture, the Decorative Value of Which Is Enhanced by the Marble Walls

Charles A. Platt, Architect

room of a dealer in house furnishings, and satisfies the mind of the dweller therein only because his æsthetic sense became atrophied in youth.

The many irrational and conflicting "schools" of art of recent years have led the confiding public into such confused emotions that it is a joy to see the reaction setting in in favor of a substantial, rational art, strong in a creative sense and with the rich background of tradition. This is manifesting itself in the fabric world and meets with the approval of all sane designers. There is a marked drift toward fullness of color and design, making interiors it is a pleasure to enter, and which always increase in interest like an often-heard symphony.



A Generous Use of Printed Linen for Curtains Rich in Colors and Almost as Effective as Tapestry. Horace Moran, Decorator

But to return to our subject. We are also passing beyond the era of shop tradition, when we were the victims of the upholsterer and curtain maker—a time when the drawing room window was draped with elaborate creations of plush with great and fearful fringes and tassels. This over-garment partly exposed two layers of gorgeous lace, and such an arrangement was considered quite correct and loudly proclaimed the financial standing of its owner. The chair of that period was upholstered, plump and bulbous, and boasted fringes like the mane of an Assyrian lion; he was indeed fleshy who could sink the springs to any degree of comfort. The walls, not hung, but covered with silk drawn taut over a padded lining, completed the picture. This in England, the mid-Victorian, was with us the "Grant" period. Today the designer instructs the mechanic how to arrange the curtains, selects not only the fabrics, but the fringes, the linings, and hardware, and finds all this as important for his composition as the details he gives to the cabinet maker.

A Window Treatment Showing the Value of Scale in the Curtains
John Russell Pope, Architect

There is a much-used piece of furniture of today for which there is no precedent in the past. This is the "all-upholstered" chair or sofa. Designers have for the past 30 or 40 years tried to add to this details of exposed wood frame in an effort to give it the character of some particular period of design. The shops are full of such creations, and they are sure to be found in the homes of those who know nothing of design and do not seek professional advice. This all-upholstered piece of furniture is not to be condemned, for it is useful and need not be made to assert itself in an interior. The solution of the problem is the omission of all elaborations of outline in the upholstery, the suppressing of all exposed woodwork, and adding to what is a piece of furniture of great comfort a covering material not aggressive. The writer recalls the salon of a duquesa at Madrid filled with gems of the

A Playful Use of Fabrics in a Room with Plain Walls
Cross & Cross, Architects

early Spanish crafts, one of the most interesting interiors in Europe, but with just such upholstered furniture for the comfort of her guests.

There are some things we overlook in the mad rush to execute work, but those who would employ textile fabrics effectively should never forget, first, that a wall hung with a fabric is usually more impressive than a wall upholstered; second, that a window should be hung with real curtains, not cluttered with meaningless drapery; third, that doorways between rooms are seldom improved by adding curtains, and fourth, that a chair seat looks and is more comfortable if concave and not convex, and that a loose cushion, the earliest form of upholstery, is always decorative and inviting.

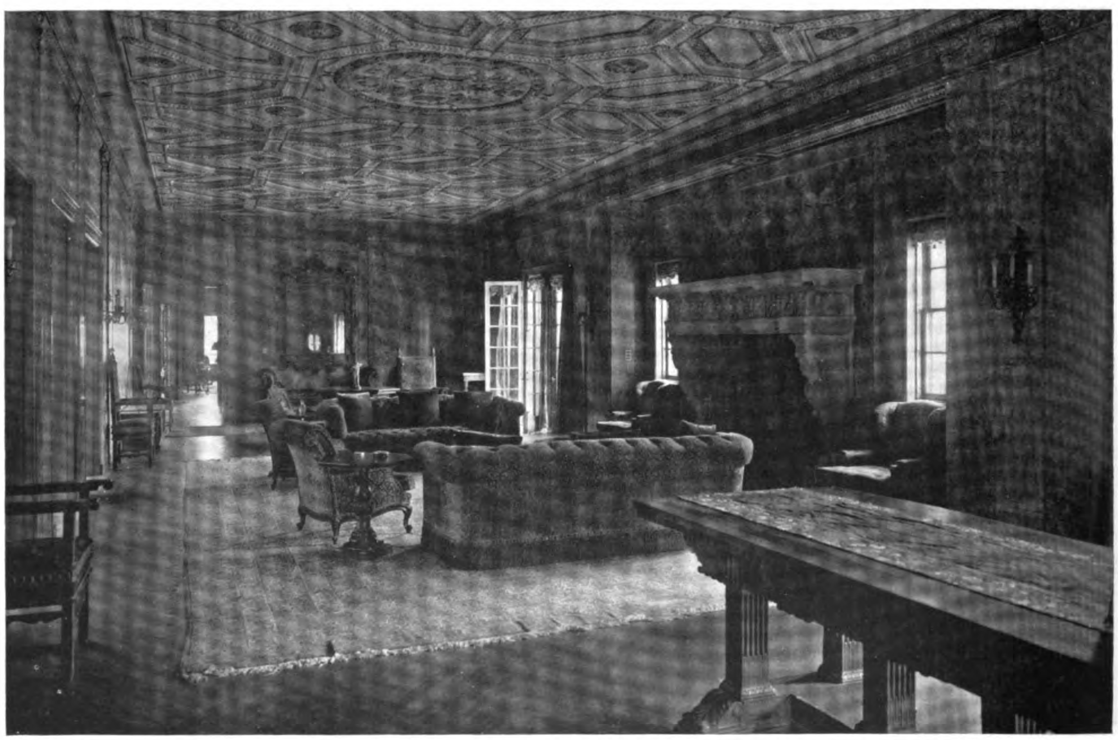
To conclude, it would seem to be appropriate to give the reader a list of all the available fabrics to be had in shops of the dealers. This, however, would be beyond the range of a magazine article, and the list here given is made up of a few items from stocks that can be found at any important dealer's show rooms, showing how extensive is this field. The names designating the fabrics in each instance create as distinct an image in the mind of designers accustomed to using fabrics as would a list of the members of a classic entablature to the architect. For curtains or upholstery there are such materials as Atsbury Velvet, Antique Mohair, Belgravia Velvet, Bradford Reps, Cordova Velvets, Jaspe Cloths, Radnor Cloths, Satin Directoire, and so on. Of materials that may only be used for curtains, there are Burma Cloths, Ming Toy Silks, Tanjore Gauze, Watteau Reps, and Sunfast Super-Kopocks.

The professional world can hardly be expected to appreciate the development of textile manufacture in this country. We are now producing every kind of decorative fabric, and can boast excellent velvets, damasks and tapestries, as well as the many varieties of less costly materials. One of our difficulties in the past was the making of enduring dyes of subtle colors, but the demand for this essential quality in fabrics is meeting with a willing response on the part of the producers. We must encourage the American mills with our patronage, and freely admire and boldly condemn where merit and failure warrant it.

The illustrations of interiors accompanying this article reveal an effort not to burden the composition with an excess of fabrics, but rather a natural placing of such materials where they will be of use and gracefully lend their decorative value to the interior.

A Room with All the Fabrics Plain, the Walls Giving Sufficient Play of Detail
John Russell Pope, Architect

A Rational Window Treatment with Curtain Poles in Pockets
CROSS & CROSS, ARCHITECTS



This Room of Marble Would Have Been Less Impressive with Other Than a Simple Treatment at the Windows
CHARLES A. PLATT, ARCHITECT

Some Furniture by Duncan Phyfe

EXHIBITION AT METROPOLITAN MUSEUM

INTEREST in early American furniture, already greatly encouraged and strengthened by study of the permanent collections of the Metropolitan Museum of Art, is being further stimulated by an exhibition, from October 16 to December 15, of a group of more than 100 examples of furniture from the workshop of Duncan Phyfe, the New York cabinet maker. The pieces exhibited have been loaned by different friends of the museum from their private collections, and although they show a broad range of design they have been limited to what are considered the best years of Phyfe's period, before 1825.

Armchair by Duncan Phyfe
Showing Sheraton Influence

Unlike all the other earlier makers of American furniture, Phyfe stands out clearly, and enough remains of his authenticated work to make possible the assigning to him of a definite place among American craftsmen. A Scotchman by birth, Phyfe came to this country about 1783 and settled in New York soon after 1790. Even the most casual study of his work will show that Phyfe worked in the style prevalent in England during the latter part of the eighteenth century. At first his design was almost purely Hepplewhite or Sheraton, but early in the nineteenth century the influence of France, which was powerful in New York at that day, brought him into contact with certain elements of directoire, consulate and early empire origin. These French influences he absorbed, and combined French forms gracefully with the English types in which he had theretofore worked.

The pieces assembled at the Metropolitan fall readily into certain well defined groups. Phyfe's furniture consisted largely of chairs, sofas, and particularly of tables. He is not known as a designer of what is sometimes called "case furniture," such as sideboards, chests of drawers and other pieces made up chiefly of drawers, but a few pieces such as dressing tables, sewing tables and sideboards are in existence. Among the side chairs which are shown in this loan exhibition many are designed in a manner which plainly shows Sheraton influence, having horseshoe seats, reeded diagonal or curved cross-bars in the backs, and reeded seat-rails and legs. Another type, slightly different, retains the back and seat of the type just described, but the front legs are reversed curves, their outer surfaces adorned with acanthus leaves. The most typical of Phyfe chairs, the type with which his name is perhaps chiefly associated, exhibit full and unmistakable directoire influence with a lyre back and with legs carved in either dog foot or acanthus pattern, and still another type employs legs similarly ornamented but includes a slat in the back, made up of an oval medallion set between carved scrolls. Chairs of these varieties are found with arms, although they are rare.

As has already been suggested, Duncan Phyfe's

Dressing Table by Duncan Phyfe

Small Table with Reeded Legs

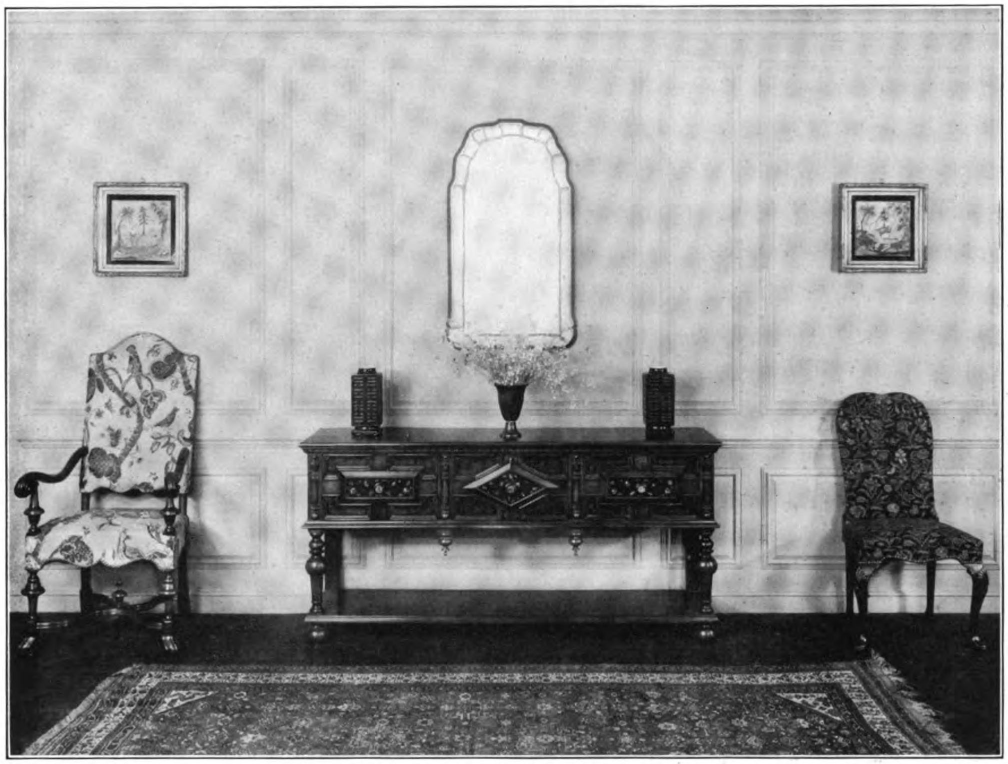
fame rests very largely upon the designs of his tables, and they may be divided into three groups according to structure: tables supported upon legs at the corners; those supported at the ends upon coupled colonnettes or else upon lyres, and those resting upon pedestals. The type first mentioned stands upon reeded legs which are straight or, as in one rare and possibly unique example, upon legs made up of reverse curves, carved with the dog foot or acanthus, these supports being quite similar to those which he often used for his chairs. Of the type which employs a pedestal there are three well defined varieties. One is that designed with a small platform which is supported upon four gracefully curved legs which are often reeded, generally terminating in a metal end or sometimes in a carved foot; this platform in turn supports crossed lyres which form a kind of pedestal upon which rests the table top. Another type, quite similar, retains the platform and curving legs, but instead of crossed lyres has four colonnettes which support the table top. The third type, used for large as well as for small tables, has the top supported upon a pedestal which often assumes the shape of an urn, from which legs carved in various spirited designs—three or more frequently four — curve outward.

Small Table with Lyre Pedestal
From Workshop of Duncan Phyfe

The French influence which lent so much of charm to Phyfe's work during what has been described as his golden period led finally to the marring of the beauty and delicacy which marked the purity of his style, for the American following of French taste extended even to acceptance of the styles of the empire when its solid, heavy forms came into vogue. Perhaps, like Chippendale and many another furniture maker before and since, Phyfe was forced against his better judgment to cater to the prevailing taste, and to design furniture in what he knew to be a debased style. His following of empire fashions was much simplified, it is true, and his ornament was handled in a somewhat restrained manner with only moderate use of decoration of gilt bronze. His furniture of this period appears to strive in a pathetic way to adhere to what might be called the letter of the empire style, while doing violence to its spirit by lightening and refining its heaviness and vulgarity—an effort, perhaps, upon the part of the student and follower of good taste to steer a middle course through the perils of a dangerous period. The effort may have proved to be too great, or possibly he was unable to check the tendency toward even more vicious design, for with the coming of black walnut and all that the name implies, Phyfe entered with the public of his day upon the downward path of bad taste, from which there was no return. Phyfe is known, happily, by only what he produced during his best period.

Typical Phyfe Work Table and Side Chairs Showing Slats with Medallions and Scrolls

KENSINGTON FURNITURE



A Wall in the Showrooms

English walnut furniture, by Kensington

Circa 1680–1715

STRANGELY enough there was little of the classic in the Dutch influence which dominated furniture design during the fifty years, from 1668 to 1718, when under the leadership of Sir Christopher Wren the Palladian tradition was firmly established in England. Yet a common appreciation of good proportions and the value of simplicity in the treatment of flat surfaces brought the furniture into harmony with its architectural background.

Due to this variety in design motive there is a freedom from stiffness in these dignified interiors that makes the style especially appropriate for important rooms in which a homelike, livable quality is desirable.

Kensington reproductions include numerous examples of this interesting furniture, authentic in every detail of design and retaining through the old-time hand processes of the Kensington craftsmen the character and the decorative quality of old work.

Architects interested in completing the interiors they design with furnishings harmonious in both character and quality are cordially invited to avail themselves of the service of the Kensington Showrooms and staff

Illustrated booklet F sent on request

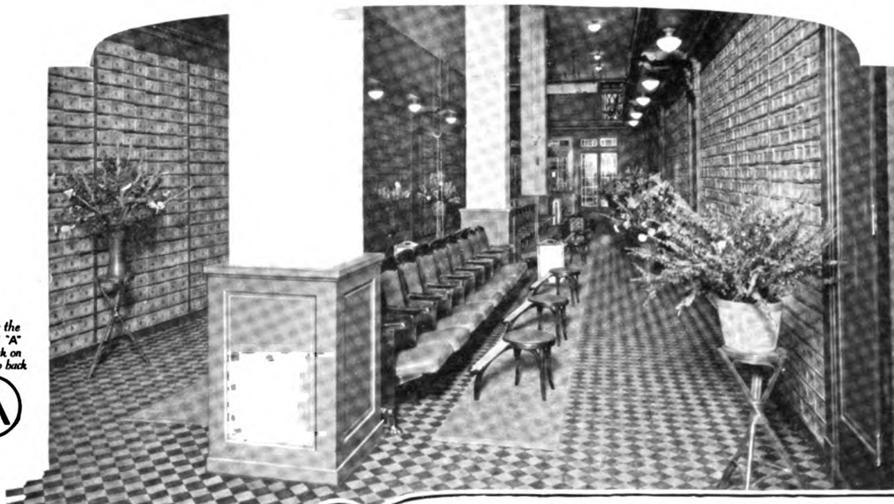
SHOPS
EAST END AVENUE
79TH STREET

WHOLESALE SHOWROOMS
14 EAST 32ND STREET
7TH FLOOR

KENSINGTON MFG. COMPANY
MANUFACTURERS AND IMPORTERS
FINE FURNITURE ART OBJECTS
NEW YORK

Armstrong's Linoleum

for Every Floor in the House



Look for the CIRCLE "A" trademark on the burlap back

A

The floor of this handsome new store in Portland, Ore., is a three-inch black and gray tile pattern (No. 201) in Armstrong's Straight Line Inlaid Linoleum.

STAIGER SHOE STORE
Portland, Oregon
1500 sq. ft. Armstrong's Straight Line Inlaid Linoleum, No. 201 laid. Specified by Strong & McNaughton. Installed by Cork Floor Products Co.

FREE MODEL EXPLAINS LAYING

A small model, as illustrated here, will be sent to any architect who is interested in better linoleum floors, laid by cementing over a lining of deadening felt. Ask on your letterhead for the model and the layer's book of instructions, "Detailed Directions for Laying and Caring for Linoleum."

Complete specifications for installing linoleum by cementing over felt are given in the sixteenth edition of Sweet's Architectural Catalog, pages 441–445.

Linoleum, the Floor for Up-to-Date Stores

DO you still think of Linoleum as an old-fashioned floor covering? Or are you acquainted with modern linoleum, handsome in design and installed as a permanent floor.

Here is a splendid example of the present-day use of linoleum—in a high-grade shoe store. This linoleum floor was laid by the contractor when the room was outfitted, as much a part of the store as the mahogany shelving or the lighting fixtures.

A well-chosen, good-looking patterned linoleum not only makes for greater cleanliness and sanitation, but is a positive sales asset as well. People like to trade where all the appointments are in good taste.

There are designs in Armstrong's Linoleum appropriate for any type of business floor—store, shop, restaurant, office. "Business Floors," a forty-eight page book showing designs in color and giving complete directions for installing and taking care of linoleum floors, will be mailed to any architect, free, upon request. Ask for a copy on your letterhead.

Armstrong Cork Co., ***Linoleum Division,*** **Lancaster, Pa.**

A6

F·SCHUMACHER & CO.

INDO-CHINESE SCENES

An achievement in tapestry reproduction

In this room in Lady Sackville's London house, hangs one of the original Soho tapestries which Schumacher has reproduced so successfully. This particular one is the original of the reproduction illustrated above.

The original Soho tapestry ot which the one illustrated here is a reproduction is one of a group of eight panels probably executed in the early eighteenth century by the famous Flemish artist, John Vanderbank.

Two of the originals were lost track of many years ago. The remaining were formerly owned by Elihu Yale in England, founder of Yale College. Today they form important historical groups in Lady Sackville's London house and in the South Kensington Museum.

Six of these Soho tapestries have been reproduced in France for F. Schumacher & Co. Hand made, in a very fine point, these reproductions skillfully preserve the unique charm and unusual color variations in the backgrounds which so distinguish the originals. The Schumacher reproductions of four of these tapestries are landscape size, 6' x 9', and the other two are uprights, 9' x 7'3".

In addition to these tapestries, Schumacher has reproduced many other beautiful designs of the same period including Louis XIV "Apollo and the Muses" panels and a set of Georgian panels, as well as other tapestries in various sizes. These may be seen in their New York office.

F. Schumacher & Co., Importers, Manufacturers, Distributors, to the trade only, of Decorative Drapery & Upholstery Fabrics, 60 West 40th Street, New York City. Offices in Boston, Chicago and Philadelphia.

Perpetuating Ideals

THE ARCHITECT recognizes beautifully carved wood as the most appropriate medium for the adornment of the church interior.

He will find our Wood Carving Studios ready to co-operate with him to any degree in the interpretation and faithful execution of his designs and specifications; or in designing fitments to conform with his architectural treatment.

Our recently published book, "Ars Ecclesiastica," contains illustrations of memorials and other church interior work in carved wood. The architect's request for a copy will bring him a useful addition to his reference library.

THE WOOD CARVING STUDIOS OF

American Seating Company

NEW YORK	CHICAGO	BOSTON
620—119 W. 40th St.	1094 Lytton Building	79 Canal Street

Individualism ~ in Good Furniture

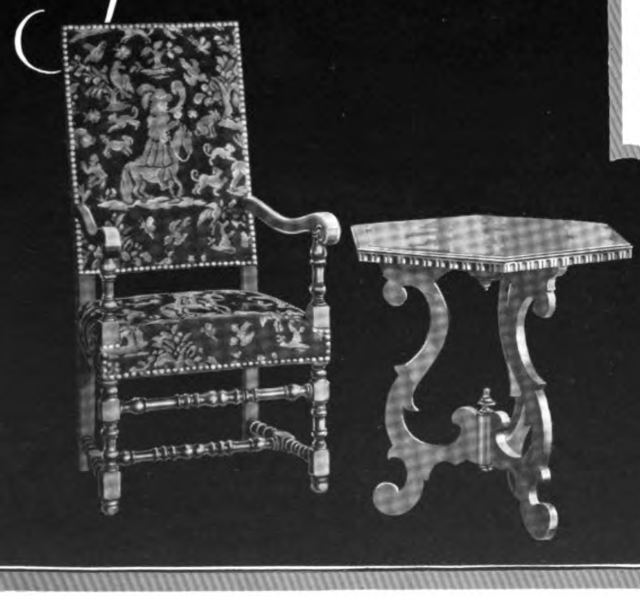
Why Furniture Is Important

BECAUSE furniture is one of the first things noticed upon entering a room it is important that it should be in absolute good taste.

Architects who gain success by careful attention to such important details are particular to select the furniture personally from the artistic models of Elgin A. Simonds Co. Furniture. For large commissions special designs are created to give an original tone to the seating equipment.

Write for interesting Booklet "M" which deals with interior design

The Elgin A. Simonds Company Furniture Syracuse N.Y.



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SERVICE SECTION
of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

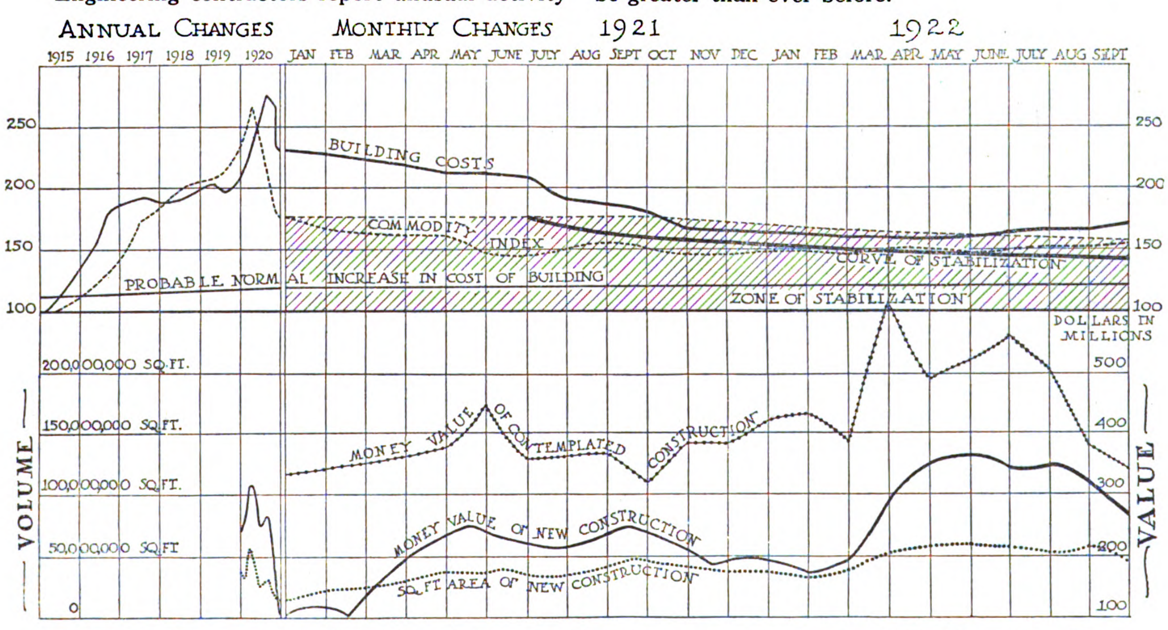
The Building Situation

THE past few weeks have recorded only a slight decrease in the volume of construction, indicating that the drop recorded in August and September has been seasonal rather than primarily due to increased costs.

Residential construction is holding up well in volume, particularly in the small house field. An analysis of the rental situation as it affects apartment buildings shows that not for many years have there been so many vacant apartments on October 1 in our larger cities. Rentals are being maintained at high levels, however, principally to justify sales prices on buildings that have passed through speculative hands. The general trend of the housing situation indicates less activity in apartment building but more interest in fine residences for next year. The building of moderate cost houses will undoubtedly be resumed actively early next year.

Engineering contractors report unusual activity in power projects and electric service buildings. Architects are very busy in the middle west and many are active in the east, although general business activity for the architect has been somewhat slower to arrive in that section. The type of work under planning for next year is excellent.

There has been a sharp increase in the cost of building, probably greater than 10 per cent in the last few weeks. Active projects are now feeling this increase, and it is definitely evident as jobs are re-estimated. It is confidently anticipated that this is only a temporary condition, however, due to the coal and labor difficulties and the readiness of some material dealers and possibly some manufacturers to take advantage of logical excuses for price raising in the midst of heavy demand. In all probability the cost of building will resume a gradual downward trend by next spring, when production facilities will be greater than ever before.

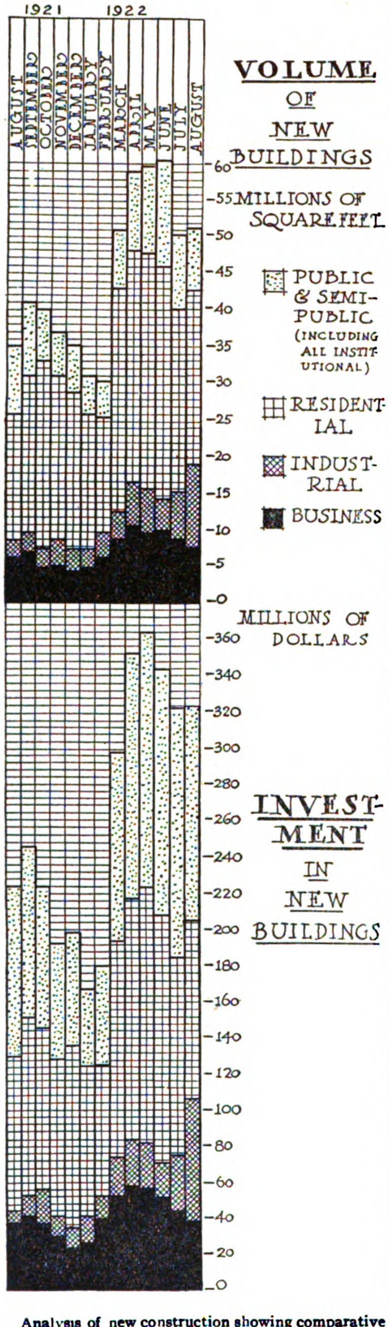


THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

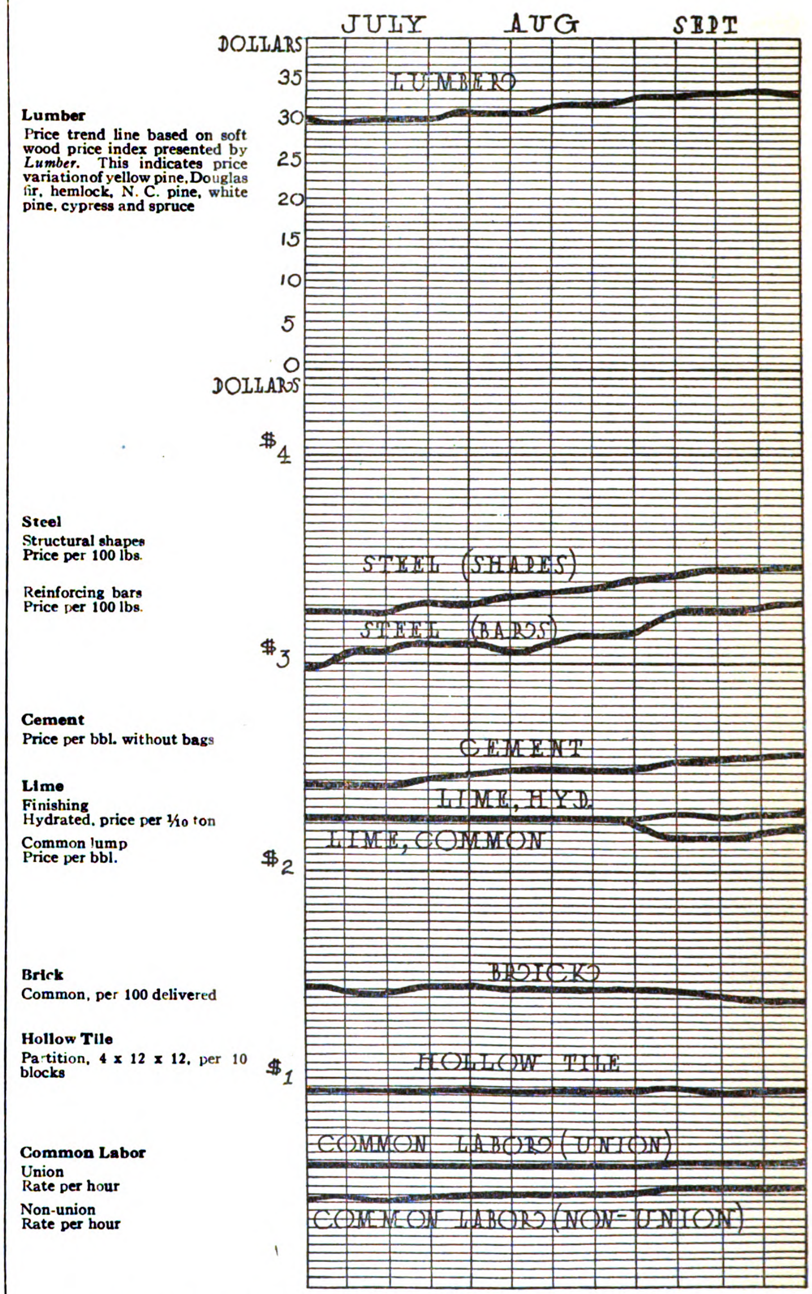
The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812: (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.

Factors of Fluctuation in Building Costs



Analysis of new construction showing comparative importance of major building types in volume and investment.



Figures used in developing all trend lines represent average prices to contractors in following cities: New York, Chicago, Denver, Seattle, Minneapolis, Atlanta, Dallas and San Francisco

THE graphic chart at the right is presented for the purpose of showing fluctuations in the prices of a number of important building materials and in labor costs. These fluctuations cover a period of three months and are shown in each issue of the Service Section in order to make possible at least a partial analysis of the building cost trend line as shown on the preceding page.

While the volume and investment chart shows a continuation of the seasonal decline and the effect of rising costs, it is interesting to realize that each month from July to September has shown a greater volume of construction than any similar month for many years past.

The trend of lines in the materials chart indicates basic reasons for the recent advance on building costs. As the winter season opens, practically all basic building materials and labor show a continued tendency to increase in price. It is confidently anticipated, however, that a reaction will again turn the trend of building costs into the long downward swing which must certainly represent the future of this line.

Eradication of the after-effects of the recent coal and rail disturbances will contribute definitely to this result. In view of the curtailed production of some commodities, notably lumber, because of the scarcity of cars, it is gratifying to note comparatively stable price conditions and indications that efforts are being made to prevent any "gouging" of the consumer.

BUILDING MATERIAL PRICES

Table Showing Average Prices Paid by Contractors for Building Materials at Local Distributing Points as of Sept. 1, 1922. Prepared by Division of Building and Housing of the Department of Commerce from Prices Secured through the Bureau of Census

Commodity	Size or Condition	Unit	Mass. Fitchburg	Mass. Haverhill	Conn. New London	New York Buffalo	New York Poughkeepsie	Penn. Pittsburgh	Penn. Erie	Md. Baltimore	Va. Richmond	W. Va. Fairmont	S. C. Columbia	Ga. Savannah	Mich. Detroit	Mich. Pontiac	Mich. Lansing	Mich. Bay City	Wis. Milwaukee	Iowa Waterloo
Common Brick		1,000	$21.00	$25.00	.....	$20.12	$18.00	$15.00	$15.75	$20.00	$17.50	$24.00	$12.00	$14.00	$17.50	$14.40	$14.00	$13.00	$12.00	$18.90
Portland Cement	Excl. of containers	Bbl.	3.20	3.55	$3.28	2.78	2.90	3.35	3.20	3.05	3.65	3.10	3.50	3.50	3.40	.....	3.75	3.15	2.40	2.60
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M.	65.00	63.00	63.00	.....	45.00	52.00	49.00	39.00	.....	45.00	.....	25.00	55.00	43.00	48.00	39.00	38.00	45.00
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.00	45.00
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M.	.....	.....	.....	.....	.....	.....	49.00	.....	30.00	45.00	20.00	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M.	52.00	40.00	40.00	.....	37.00	49.00	50.00	.....	33.00	45.00	23.00	.....	75.00	48.00	45.00	37.00	.....	45.00
Y. P. Flooring E.G."C"	1x4-10'-16'	M.	.....	100.00	80.00	.....	107.50	.....	110.00	.....	75.00	.....	75.00	.....	100.00	.....	75.00	.....	80.00	80.00
Douglas Fir V.G. No. 2	1x4-10'-16'	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100.00	.....	.....	.....	75.00	80.00
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	6.30	7.50	.....	6.00	.....	7.25	6.50	.....	.....	.....	6.00	.....	.....	6.50	.....	6.50	.....	6.50
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.00	.....	.....	.....	.....	.....	.....	6.50
Composition Shingles	Crushed slate surfaced	100 sq. ft.	7.50	7.75	6.50	.....	6.00	6.25	5.50	.....	.....	.....	6.25	6.50	6.50	6.00	7.50	6.00	6.50	7.50
Gypsum Plaster Board	3/8"	1,000 sq. ft.	.....	45.00	50.00	45.00	45.00	37.50	45.00	45.00	40.00	40.00	35.00	40.50	.....	40.00	45.00	38.00	30.00	32.00
Lime	Hyd. Com.	Ton	18.00	.....	.....	16.00	22.00	20.00	20.00	15.00	17.00	15.00	20.00	22.50	18.00	15.00	20.00	16.50	.....	25.00
Building Sand		Cu. yd.	1.80	2.20	1.50	1.28	2.00	2.50	3.00	2.00	1.40	3.75	1.00	2.20	2.50	1.50	1.80	2.00	2.00	1.75
Crushed Stone	3/4"	Cu. yd.	3.00	2.50	.....	1.30	2.40	5.50	3.00	.....	2.00	6.25	2.75	5.50	2.50	.....	2.80	4.00	2.25	3.50
Window Glass	Single A 10"x12"	50 sq. ft.	5.50	.....	.....	3.90	.....	.....	.....	4.20	4.50	4.40	6.40	.....	.....	.....	.....	5.15	5.25	6.00
Hollow Tile	8"x12"x12"	Each	.27	.28	.25	.22	.24	.21	.20	.21	.....	.22	.19	.....	.21	.17	.16	.15	.13	.13
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	58.80	47.00	80.00	.....	74.00	.....	.....	.....	.....	.....	52.00	.....	51.00	.....	50.00
Steel Pipe	1" galv.	100 ft.	.....	.....	.....	10.00	9.00	8.50	.....	9.00	7.50	11.00	9.46	.....	8.93	8.50	.....	9.75	10.50	12.00
Reinforcement Bars	3/4" square	100 lbs.	.....	.....	4.25	.....	4.50	3.00	.....	3.25	3.25	3.00	4.25	3.50	.....	.....	3.50	.....	.....	3.20
Structural Steel	Fab. 6" I-beams	100 lbs.	5.50	6.00	.....	.....	.....	2.70	.....	.....	3.75	4.50	4.10	.....	.....	.....	3.50	3.10	.....	.....
Gypsum Plaster	Neat	Ton	.....	.....	.....	.....	20.00	22.00	24.00	22.50	22.00	16.00	20.00	.....	19.00	.....	17.50	.....	16.50	18.00
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	13.00	13.50	.....	.....	12.50	11.50	.....	.....	.....	17.10	.....	16.50	21.00	16.00
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	3.25	2.50	.....	2.00	2.50	1.95	2.00	.....	.....	.....	.....	1.95	1.95	2.75	3.00	2.70	.....	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.25	1.60	.....	1.05	1.25	1.20	1.00	1.25	.95	.90	1.00	.80	.80	1.00	.....	1.00	1.00	1.50

Commodity	Size or Condition	Unit	Iowa Des Moines	Iowa Council Bluffs	Mo. St. Louis	Mo. Kansas City	Cleveland	Akron	Ohio Dayton	Toledo	Cincinnati	La. New Orleans	La. Shreveport	Texas San Antonio	Ariz. Tucson	Wash. Spokane	N. Dak. Grand Forks	S. Dak. Sioux Falls	S. Dak. Aberdeen	Calif. Sacramento
Common Brick		1,000	$16.00	$16.50	$14.50	$16.50	$16.00	$14.50	$17.00	.....	$18.00	$14.00	$13.50	$17.00	$12.00	.....	$15.00	$15.00	$16.00	$17.00
Portland Cement	Excl. of containers	Bbl.	.....	.....	2.85	2.90	3.20	3.25	3.50	.....	2.76	3.10	3.50	3.10	4.40	.....	3.80	3.00	.....	3.30
Yellow Pine No. 1	Dimension 2x4-16' S1S1E	M.	44.00	43.00	46.00	46.00	.....	50.00	45.00	$49.00	44.00	45.00	44.00	45.00	.....	.....	.....	.....	.....	.....
Douglas Fir No. 1	Dimension 2x4-16' S1S1E	M.	44.00	42.50	43.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	55.00	$25.00	50.00	47.50	44.00	39.50
N. Carolina Pine No. 1	Dimension 2x4-16' S1S1E	M.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Boards No. 1	1x6	M.	42.00	41.00	49.00	51.00	49.00	50.00	.....	.....	.....	35.00	50.00	49.50	50.00	27.00	46.00	44.00	41.00	40.50
Y. P. Flooring E.G."C"	1x4-10'-16'	M.	.....	96.00	74.00	72.50	96.00	95.00	90.00	80.00	100.00	82.70	.....	.....	.....	.....	95.00	.....	.....	.....
Douglas Fir V.G. No. 2	1x4-10'-16'	M.	95.00	94.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92.50	70.00	.....	80.00	81.00	76.50
Red Cedar Shingles	Extra clear 16" 5 to 2	100 sq. ft.	6.00	6.00	7.18	6.50	5.76	7.00	5.20	6.40	5.40	.....	7.50	.....	.....	.....	.....	5.50	5.75	.....
Cypress Shingles	Extra clear 16" 5 to 2	100 sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8.00	.....	6.50	.....	6.50	.....	.....	.....
Composition Shingles	Crushed slate surfaced	100 sq. ft.	.....	8.00	6.37	5.80	6.00	.....	6.00	6.75	.....	6.71	7.50	.....	.....	.....	8.00	7.50	8.00	.....
Gypsum Plaster Board	3/8"	1,000 sq. ft.	35.50	.....	42.25	45.00	46.00	.....	32.50	42.50	.....	40.00	45.00	.....	55.00	.....	60.00	.....	.....	.....
Lime	Hyd. Com.	Ton	27.50	.....	20.00	.....	15.60	17.60	14.00	18.00	15.80	14.00	27.50	19.00	.....	.....	.....	.....	25.00	.....
Building Sand		Cu. yd.	.....	3.50	2.60	.....	2.50	1.75	1.80	.....	1.80	1.45	2.00	2.25	1.15	.....	3.00	1.50	3.25	1.50
Crushed Stone	3/4"	Cu. yd.	3.00	5.00	.....	3.00	.....	3.25	2.50	.....	2.20	.....	.....	1.80	3.00	.....	.....	.....	.....	2.75
Window Glass	Single A 10"x12"	50 sq. ft.	4.50	.....	3.90	4.50	.....	4.20	4.50	.....	.....	4.20	4.50	.....	5.40	.....	4.80	.....	.....	.....
Hollow Tile	8"x12"x12"	Each	.....	.15	.....	.22	.....	.17	.18	.....	.18	.17	.25	.20	.18	.....	.....	.....	.....	.....
Cast Iron Soil Pipe	4" E.H. 13 lbs. per ft.	Ton	.....	.....	.....	.....	.....	.....	.....	.....	.....	91.75	59.00	.....	76.00	.....	46.00	.....	.....	.....
Steel Pipe	1" galv.	100 ft.	9.37	.....	.....	.....	.....	9.51	8.57	.....	.....	9.86	9.40	.....	11.70	11.93	8.00	.....	.....	10.85
Reinforcement Bars	3/4" square	100 lbs.	2.68	3.15	.....	2.90	.....	3.25	3.00	.....	.....	4.00	4.00	.....	4.00	4.10	3.80	4.00	.....	3.05
Structural Steel	Fab. 6" I-beams	100 lbs.	.....	3.60	4.00	3.85	.....	3.25	3.25	.....	.....	.....	4.00	.....	.....	.....	5.90	5.00	.....	4.30
Gypsum Plaster	Neat	Ton	.....	17.50	18.50	15.50	.....	19.00	19.00	.....	.....	25.00	24.00	.....	23.00	.....	.....	15.20	20.00	.....
Roofing Slate	No. 1 Ribbon	100 sq. ft.	.....	.....	.....	.....	.....	11.00	16.5	.....	.....	16.50	12.00	.....	.....	.....	.....	.....	.....	.....
Tar Paper, Roofing	2-ply 75 lbs. per roll of	100 sq. ft.	2.63	2.80	.....	.....	2.50	.....	2.25	.....	.....	.....	2.60	.....	3.25	.....	.....	2.95	2.25	.....
Rosin Sized Sheathing	3-ply 30 lbs. per roll of	500 sq. ft.	1.08	1.25	.94	.....	.90	.....	1.15	.....	.....	.94	1.50	.....	1.75	1.13	1.50	1.30	.....	1.00

THE FORUM CONSULTATION COMMITTEE

A group of nationally known experts on various technical subjects allied to building, providing a direct service to architects

THE editors of THE ARCHITECTURAL FORUM have been fortunate in obtaining the co-operation of the following recognized experts who constitute THE FORUM Consultation Committee. This Committee provides a service of the greatest value to subscribers in addition to the usual editorial service, and architects who seek information on specific questions in these various fields are invited to present inquiries.

The basis on which this Committee has been organized is:

(a) That each Committee member shall be a representative leader in his line;
(b) That no Committee member has affiliations with any manufacturer;
(c) That no Committee member will be called upon for detailed service excepting by special arrangement;
(d) That a special editorial article on a subject represented under each of the headings below shall be prepared during the year by the Committee member.

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NILS T. SELLMAN

Service Engineer, American Gas Association

A specialist in problems pertaining to gas service and its use in all classes of buildings and industries.

HOTEL DESIGN AND EQUIPMENT

DANIEL P. RITCHEY

Known in the hotel field as the "hotel doctor." Mr. Ritchey, who is an engineer as well as an experienced hotel owner and manager, is qualified to answer any questions which may arise in this connection.

HEATING AND VENTILATING

CHARLES A. FULLER

Consulting Heating and Ventilating Engineer

Member of firm of Griggs & Myers, New York. Widely experienced in the field of heating and ventilating design for office buildings, institutions and industrials; specialist on investigation and report work on mechanical equipment for new and old plants.

ELECTRICAL SCIENCE

WILLIAM L. GOODWIN

Assistant to the President and in charge of activities of the Society for Electrical Development

This Society is organized to promote accurate knowledge of the practical application of electricity. Its activities extend from the simple problems of household equipment to highly developed electrical plants. Particular attention is given the development of provision for electrical service in buildings.

SAFETY ENGINEERING

S. J. WILLIAMS

Secretary and Chief Engineer, National Safety Council, Chicago

Safety engineering is an important factor in the design of buildings where large groups of people congregate. The National Safety Council has investigated construction and devices with the greatest minuteness.

FARM SCIENCE

FREDERICK WALTER IVES, B.S., M.E.

Professor and Head of Department of Agricultural Engineering, Ohio State University. Consulting Agricultural Engineer, Columbus, Ohio.

Specialist in land drainage, soil improvement, surveys, farm arrangement for economical production, purchase of equipment and economical layout of farm buildings with special reference to interior arrangement.

Address inquiries to committee members, care THE ARCHITECTURAL FORUM, 103 Park avenue, New York

THE FORUM DIGEST

A SURVEY OF IMPORTANT CURRENT ARTICLES ON BUILDING ECONOMICS AND BUSINESS CONDITIONS AFFECTING CONSTRUCTION

The Editors of this Department select from a wide range of publications matter of definite interest to Architects which would otherwise be available only through laborious effort

EFFECT OF OBSOLESCENCE ON THE USEFUL LIFE OF OFFICE BUILDINGS

AN interesting presentation of this important subject was recently made by Earle Schultz, President of the National Association of Building Owners and Managers in *Buildings and Building Management.* To determine the effect of age on the income and expenses of office buildings, reports were obtained from 155 buildings. The charts shown herewith indicate results.

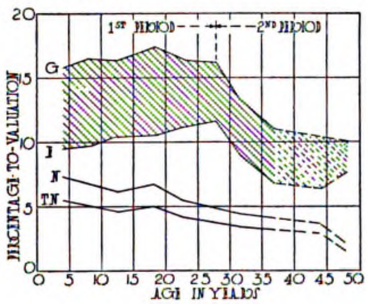

Chart I

"It will be seen from Chart I that the life of an office building may be divided into two periods.

"Period 1 extends from the erection of the building to about the 28th year. During this period the gross income is nearly constant. The expenses, however, rise continuously with a corresponding falling off in the net return. This period represents the useful and profitable life of an office building, during which it is earning an adequate return on the investment. During most of this period, the buildings are able to maintain themselves as first-class buildings housing the best grade of tenants.

"Period 2 extends from the 28th year to the end of the building's life. During this period the gross income of the building falls very rapidly as also do its operating expenses, while the net income continues to decline at a somewhat faster rate than during the first period. At the beginning of this period the building finds that through the action of obsolescence in any one or more of its several forms it is losing its better class of tenants and that it is impossible for it to maintain its income at its previous level. Because of this falling off in income, it must necessarily reduce its operating expenses in proportion by giving a cheaper grade of service, thus becoming a second grade building. In spite of all that can be done to reduce operating costs, the ever-increasing extent of repairs and replacements necessary in an old building serve to increase expenses, with the result that if the building continues in existence it soon becomes a non-producer and is very often operated at a loss.

"Period 2 necessarily ends with the life of the building, which occurs when obsolescence has progressed so far that the building is torn down to be replaced by a new structure. Later in this report many illustrations will be cited of buildings thus torn down and replaced at ages varying from 15 to 40 years. Because of the fact that when a building has arrived at the second period of its life and it is only a question of time when it will have to be torn down, its investment value declines very rapidly and is very often extinguished entirely. That is, whereas if a building is sold during the first period of its life, it will bring a price somewhere near its cost; if it is sold in the second period of its life, it will bring a very much smaller price, and very often will not be considered as adding any value whatever to the land on which it stands. As a consequence, while a building in the second period of its life may for a time under favorable conditions continue to be operated at a small margin of profit, obsolescence will have largely or wholly destroyed its sale value.

"The solid line represents the actual five-year averages, and the dotted line a theoretical curve drawn through these averages. From these curves it will be seen that during the early years of its life, the value of the average building is equal to the value of the land on which it stands. This ratio, however, increases more and more rapidly until at the age of 50 years the value of the land has become six times the value of the building. In other words, if a lot now valued at $100,000, for instance, requires as an adequate improvement a building costing $100,000 or more, then after a period of 50 years when the value of this lot has become approximately $500,000, any improvement thereon to be adequate must have a value of $500,000.

"A study of the present ratio between land and building for buildings of different ages will indicate the effect which the growth of the business district of a city has in rendering buildings inadequate improvements of the land. This has been done by taking the ratio between land and building for all the buildings reporting, and grouping them by ages to obtain five-year averages as previously explained. The averages thus obtained are indicated on Chart II. On this chart the two curves marked 'AA' represent the increasing ratio between land and building as the age of the building increases.

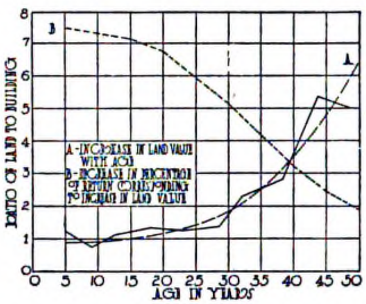

Chart II

Obsolescence in Type of Construction

"It is generally believed that the present type of office building represents the highest possible development of these structures, and consequently that they will not suffer from obsolescence in type as have the older buildings. A study of the growth of the office building and of the purpose and plan of its design will easily convince anyone that it has by no means arrived at a state of perfection.

"There has been very little office building construction throughout the country for the past six years, due to the excessive cost of labor and material, so that the supply of office space in most cities is, at the present time, inadequate. As the cost of construction gets back to normal and as business conditions improve, there will be a revival of office building construction, and out of this revival is sure to come a new type of building. If office building owners and managers have learned any one thing during the past period of inflation, it has been the necessity of economical operation. The new type of office building will, therefore, be built primarily as an investment and designed not only for efficiency of layout to produce the greatest gross income, but also for economy of operation to give the lowest operating cost. Forerunners of this type are already appearing. These newer buildings are thoroughly standardized in their layout, and their lighting, plumbing and heating arrangements are such as to permit of the moving of interior partitions without affecting any

of the mechanical equipment of the offices. In the proposed Dexter-Horton Building, to be erected next year in Seattle, this standardization has been carried to a high state of development. The cost of alterations in this building should be but a small percentage of that experienced by the average building today. This plan of standardization was also adopted in the General Motors Building in Detroit. In one regard the latter building has gone a step further. In it they are using movable steel partitions that can be taken apart and reassembled for any new layout of office space desired. In fact, quite a number of buildings in cities requiring all steel interior construction are using these movable partitions. They are as yet expensive in their first cost and are not, by any means, perfect in their design. It is only a question of time, however, until partitions of this sort will be developed that will have the greatest flexibility and will be very economical in their operation.

"One of the difficult problems of operation of the present office building is that of heat and ventilation. The office building is one of the most wasteful users of heat, because its use is entirely in the hands of the tenants who waste it without regard to cost. The new type of building will probably be mechanically ventilated throughout (as is the Chicago, Burlington and Quincy office building in Chicago) with double glass windows permanently closed. In this way the air in the office building will be at all times not only purified, but either heated or cooled to the proper temperature and moistened to the proper humidity. A building so equipped would add very materially to the efficiency and health of its occupants, and consequently would attract tenants from buildings not so equipped. Such an installation would also reduce the operating cost of heating by eliminating waste, and it would, by keeping out the dust-laden air, also eliminate much of the expense of cleaning and decorating.

"The recent Burlington fire in Chicago, in which eight floors of this very high type of fire-proof building were completely gutted by an exterior fire which came in through the windows of the building and was provided with fuel by the wooden furniture in the building, will probably lead to two new features in the coming type of building. One will be some method of protecting the windows of an office building from exterior fire exposure; the other the exclusion of all wooden furniture. It will be only through the adoption of these two provisions that an office building can afford complete fire protection to its tenants."

STANDARDIZING LUMBER AND METAL LATH

"THESE notes regarding progress of standardization in building materials appear in a recent issue of *Engineering News-Record:*

"Agreement has been reached by the central committee on lumber standards, which was appointed by the several branches of the industry last July, to formulate a program for simplification of the industry. It is planned (1) to collect and analyze all information that will aid in the simplification of sizes, grades, and names of lumber products; (2) to submit these findings to the producers, distributors, and consumers by means of the associations in these fields; (3) to promote discussion of the questions involved and to harmonize differences of opinion; (4) to establish a grade-marking and inspection service that will guarantee to the consumer the quality and quantity of his lumber purchases; and (5) to arrange a national conference of representatives of all branches of the industry which would finally adopt specific practices in these fields that will conform to the requirements of the Department of Agriculture and the Department of Commerce.

"Following the reduction in standard sizes of paving brick and lumber initiated by the Department of Commerce, work is now under way in the standardization of metal lath. A reduction from 71 to 9 in the number of weights and styles of lath was recommended at a preliminary conference held at the Department of Commerce Oct. 2. The manufacturers have worked out a plan for this reduction which they believe will be acceptable to contractors and other consumers.

"A general conference will be held Dec. 12 to which manufacturers, distributors and consumers will be invited. At that conference, it is expected that a definite conclusion will be reached."

BASIC DEFINITIONS AND CLASSIFICATIONS OF LUMBER

THE Central Committee on Lumber Standards, which met for four days during the first week of October in Washington, has assembled information on trade practices in all parts of the country, and out of its work it is hoped standards governing the production and use of lumber will come. Some of its recommendations have already been placed before the lumber industry, and perhaps of most importance are the suggested standard classifications of use, size and manufacture.

It is also suggested that there be a single standard name to identify each important commercial species, and that such standard names be exclusively used in the grading and inspection rules and in official association publications, and that their universal recognition throughout the lumber trade be promoted. A suitable outline of such species names is still to be prepared.

The definitions already agreed upon in committee are:

I. Use Classification

Lumber is the product of the saw and planing mill, not further manufactured than by sawing, resawing, and passing lengthwise through a standard planing machine, crosscut to length, and matched.

Lumber is classified as (1) yard lumber, (2) shop or factory lumber, and (3) structural timber. Different grading rules apply to each class of lumber.

(1) Yard lumber is lumber that is less than 6 inches in thickness and is intended for general building and construction purposes. The grading of yard lumber is based upon the use of the entire piece.

(2) Shop or Factory lumber is lumber intended to be cut up for use in further manufacture. It is graded on the basis of the percentage of the area which will produce a limited number of cuttings of a given minimum size and quality.

(3) Structural Timber is lumber that is 6 inches or over in thickness and width. The grading of structural timber is based upon the strength of the piece and the use of the entire piece.

Yard lumber is classified roughly as (a) Finish and (b) Construction lumber. There is no sharp line between finish and construction lumber. The medium grades may be used for either purpose.

(a) Finish is yard lumber of the higher grades in which appearance, perfection of the surface, and finishing qualities are primarily the basis on which the grade is determined. The higher finishing grades are more suitable for "natural" or transparent finishes while the lower finishing grades are smooth and free from serious defects and are particularly adapted to the use of paint.

(b) Construction lumber is yard lumber which is graded primarily upon the basis of its strength, as affected by defects, and its fitness for general construction purposes.

II. Size Classification

(1) Strips are yard lumber less than 2 inches thick and under 8 inches wide. Strips are usually manufactured into matched and patterned lumber.

(2) Boards are yard lumber less than 2 inches thick and 8 inches or over wide.

(3) Dimension includes all yard lumber excepting boards and strips and timbers; that is, yard lumber 2 inches and under 6 inches thick and of any width.

(a) Planks are yard lumber 2 inches and under 4 inches thick and 8 inches and over wide.

(b) Scantlings are yard lumber 2 inches and under 6 inches thick and under 8 inches wide.

(c) Heavy Joists are yard lumber that is 4 inches and under 6 inches thick and 8 inches or over wide.

(4) Timbers are lumber 6 inches or larger in their least dimension.

III. Manufacturing Classification

Manufactured lumber is classified as (1) Rough, (2) Surfaced, and (3) Worked.

(1) Rough lumber is undressed lumber left as it comes from the saw.

(2) Surfaced lumber is lumber that is dressed by running through a planer. It may be surfaced on one side (S1S), two sides (S2S), one edge (S1E), two edges (S2E), or a combination of sides and edges (as S1S1E, S2S1E, or S1S2E).

(3) Worked lumber is lumber which has been through a matching machine, sticker or moulder. Worked lumber may be (a) matched, (b) shiplapped or (c) patterned. Patterned lumber is usually matched or shiplapped.

(a) Matched lumber is lumber that is edge dressed and shaped to make a close tongue and groove joint at the edges or ends when laid edge to edge or end to end.

(b) Shiplapped lumber is lumber that is edge dressed to make a close rabbeted or lap joint when laid edge to edge.

(c) Patterned lumber is worked lumber that is shaped to a patterned or moulded form.

BUILDING COSTS ON PERMANENTLY HIGHER SCALE

TO all who follow the trend of building it is quite evident that building costs will remain on a higher plane than existed before the war. Graphic records of the cost increases in the elements that make up building cost are always valuable in pointing out to clients the reasons for continued high costs, and we present as of interest some charts based on those appearing in *The Constructor* for October, 1922.

In commenting on them *The Constructor* says: "It will be evident from the cost of building diagram that building costs are now 75 per cent greater than they were in 1913, and exceed the corresponding figures for any month prior to July, 1919. (The solid line in this diagram shows building costs, and the dotted line general wholesale commodity costs over the same period.)

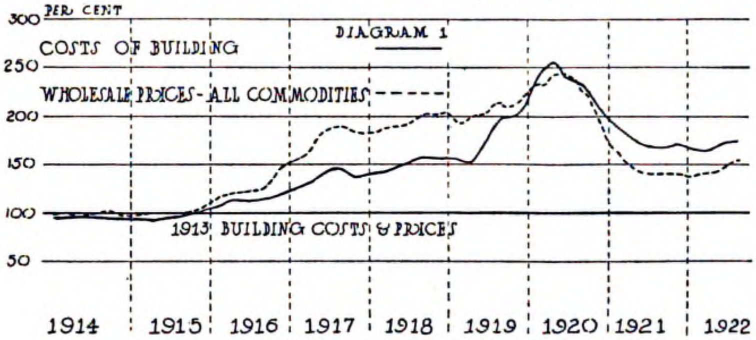

Fig. 1. Cost of Building Index and Wholesale Price Index

"Diagram 2 shows the index of building material prices computed by the Department of Labor, and is a composite of prices of some 40 different materials for which quotations are obtained from a large number of different points. Diagram 3 shows how wages in the building trades have varied in the same period and shows averages of the wages paid in 11 of the building trades in 8 representative cities. The index of the cost of building in Diagram 1 is a composite of the material index and wage index in which the former represents 60 per cent, and the latter 40 per cent of the final result. These diagrams and the index of wholesale prices of all commodities show that practically nothing can be purchased today at pre-war prices. The commodity index is a composite of the prices of over 400 different articles. It is similar in shape to that of the building cost line; average prices did not go quite so high in 1920, and they are not quite so high now as the price of building materials or the cost of completed buildings. The commodity index includes a number of important items, such as zinc, tin, copper, and rubber, which for reasons easily explained in each case are now selling at figures below pre-war prices. This helps to explain why the index of wholesale prices is at a lower point than that of building materials.

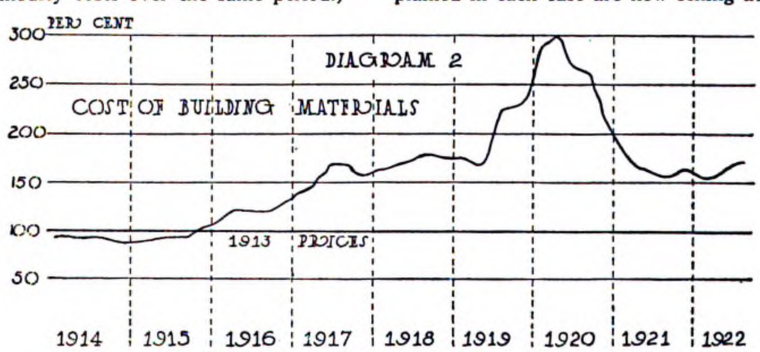

Fig. 2. Cost of Building Materials Index

"It will be noted that each of the diagrams shows an increase in prices during the past few months. This is what always happens to prices when business is recovering from a depression. It does not mean that prices are going back to where they were in 1920, and it probably does not mean that they are going very much higher than they now are, but it is a very strong argument for the contention that prices have settled down to a relatively permanent new price level. In other words, prices for some years to come will probably fluctuate in accordance with the ebb and flow of general business prosperity above and below some average point located at just about the present level."

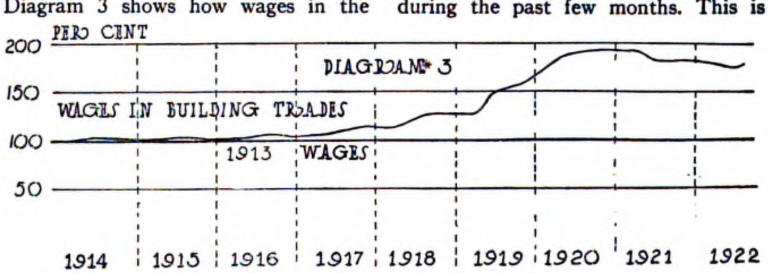

Fig. 3. Index of Wages in the Building Trades

It may well be that some time in the future, perhaps 20 years from now, the general average of prices may again be down to the 1913 figure or below it. But if we are to judge by past history, building costs will probably not go down in equal ratio. In the Civil War period just as in the World War period, the cost of building increased enormously, and this increase was due very much more to higher prices for materials than it was to higher wages. Although wages went up more slowly and relatively much less, they afterwards came down more slowly and relatively not so far as the price of materials. Following the Civil War peak and the subsequent depression there was, beginning with 1870, a period of about two and one-half years during which the price of building materials increased and also the cost of building. We seem to be now experiencing the beginning of a similar rise in prices. It is not safe, however, to figure on a close parallel between the two periods but we may conclude, that the extreme price changes of the war period are passed; that if prices in general again reach their pre-war level it will only be after many years; that wages will probably never go down to their pre-war level; and that the total cost of building, likewise, is permanently higher than it was before the war.

FACTS ABOUT BUILDING IN COLD WEATHER

ARCHITECTS will be interested in the following facts presented by C. S. Hill in a recent issue of *Engineering News-Record.* This analysis of the question of building in cold weather should encourage a decrease of seasonal activity:

"*Concrete and Building Construction*—Work on concrete structures of all kinds, and building operations generally, are commonly carried on in winter. Methods have been highly perfected and are now textbook knowledge. The conditions can be stated thus:

1. All concreting and building masonry operations can be carried on in winter with dispatch and absolute safety by heating the materials, housing in the work under construction and heating the enclosure.

2. Steel erection in winter is largely a function of storm and temperature. In any weather in which the workman can withstand the cold and work safely, structural steel can be erected.

3. Interior building work, plumbing, steamfitting, plastering, etc., can be performed in winter with little loss of efficiency.

4. Winter construction in building adds from 3 to 10 per cent to the cost according to the records of large concrete building contractors.

5. There is probably some greater risk of poor workmanship in winter concreting, masonry work and steel erection which calls for more exacting supervision and inspection.

"*General Conclusion*—Nothing in the general conditions laid down, or in the conclusions from practice, place the problem of methods of winter construction beyond the range of easy solution by engineers and contractors. With very moderate inquiry and analysis it would be practicable to state recommended practices or standard methods. This investigation may precede more complex study of economic conditions because whether or not winter construction in general is economical there are always individual operations which it will pay to carry on in winter. In other cases, such as winter hauling in road building, it may be profitable to perform parts of the work in winter. As a broad generalization of the technical problem of winter construction it may be concluded that any kind of construction can be performed for which the owner is willing to pay cold weather prices.

"*Economic Problems*—The economics of winter construction do not lend themselves to the simple methods of handling the technical problem. As applied to a single structure the economic question is: Will possession of the structure at a definite earlier date be of enough value to pay for the extra cost of winter construction and leave a little over? Visualizing the construction industry as a whole the query is much the same. While, however, in the case of the individual structure the means are at hand for a ready answer there are inadequate, indeed almost no, data by which to determine the answer for the whole industry. Determination of these data is the great task of research before engineers and contractors and the *determination needs to be quantitative.*

"Briefly, winter construction appears to offer economies by (1) spreading overhead costs over 12 producing months instead of some less period; (2) reducing the seasonal employment of men in construction and the allied industries; (3) ironing out the peak in the curve of production of construction materials and equipment; (4) equalizing the demand on transportation agencies. The economic waste in all these activities due to reduction of construction during cold weather is universally admitted as a general truth but there are no determined figures of the amount of waste. These quantitative data are what research is called upon to supply. The reasons are:

1. The construction industry is the servant of the building public and evidence of specific savings is necessary to induce the building public to alter its practices.

2. Without full knowledge of the economic waste from winter idleness in construction the industry cannot stabilize its own business or assume the duty, which it must, of teaching the public."

DATA FOR THE PLANNING OF PUBLIC GARAGES

SOME interesting information has been recently published in the monthly bulletin of the Ramp Buildings Corporation of New York. This provides definite data on general dimensions for passenger car and truck garages:

"The average automobile is 15 feet long, and in designing a garage it is advisable to allot a space of 6½ x 15 for each car. This space is not and does not include any frontage occupied by columns. Fords are 11 feet long, and a few of the largest cars are 18 feet in length. There are now several cars of approximately the size of the Ford, and among these may be listed the Chevrolet and the Star. The Cadillac is about 16 feet over all, whereas most of the cars selling for around $1,000 are 12 to 13 feet long. The average garage aisle is 20 feet wide. On this basis the minimum width of a building is about 50 feet, although buildings occasionally are made 45 feet wide and even 40 feet. A 45-foot building is feasible provided the cars to be stored are not too large, but 40 feet is never satisfactory and it is better to abandon the idea of using it.

"It is rapidly becoming common practice to make the distance between floors 10 feet in the clear, and in some cases even 9 feet has been used with satisfaction. Extreme headroom is not desirable, because it increases the cost of the building unduly and also because it increases the steepness of the ramp or the distance which the elevator must travel. In a garage building solely for passenger cars there is no reason for making the floors more than 11 feet apart, and in most cases it is quite practical to make them 10 feet.

"Where it is necessary to arrange the columns for the economical storage of both passenger cars and trucks, interchangeably, it is a good plan to use four car bays with 6½-foot spacing. In other words, the net frontage of the bay will be 26 feet which will accommodate three large trucks, four delivery cars or four passenger cars.

"Trucks vary considerably in size. Their lengths run all the way from 11 feet for a Ford to approximately 22 feet for a large truck. The Ford will have a width of a little less than 6 feet while the big truck may be more than 7 feet broad. Five-ton trucks ordinarily require a space 8 x 20 or, in rare cases, 22 or 25. There are comparatively few five-ton trucks, however, compared to two-and three-and one-ton trucks. Therefore, in designing a truck garage it is usually not necessary to have very many spaces 8 x 22. The average two-or three-ton truck will occupy a space 7½ x 18.

"In designing a truck garage it is extremely desirable to know whether the bulk of the business will consist of the storage of small trucks or large trucks. Where this point cannot be determined, or where it is feared that the character of the truck storage may change, it is advisable to use a spacing of about 7 feet for the trucks making the bays four trucks wide, or 28 feet net. Such a bay will accommodate three very large trucks without wasting too much space and, on the other hand, will accommodate four trucks of medium and small sizes. Such a bay, for example, might house one delivery car, two one-ton trucks, and one three-ton truck.

"The tallest trucks require headroom of about 11 feet, whereas there are many trucks that do not require headroom of more than 9 feet, and smaller trucks and delivery cars may not need headroom of more than 8 feet. It all depends upon the type of body. It is a good plan, therefore, in designing a truck garage to design the first floor with sufficient headroom to accommodate the largest trucks; in other words, with a headroom of 11 feet clear for the first floor, the second floor with, perhaps, 9 feet clear, and the third floor with headroom of 8 feet net. At least, this arrangement will be feasible with a three-story building to house equal numbers of small, large, and medium sized trucks."

LUMBER MARKET OUTLOOK

PRESENT conditions in the lumber market are indicated by these notes from *Lumber*, October 13, 1922:

"The lumber market appears to be more stationary than it has been for some months, and this applies to prices as well as to movement of the product. The cleaning up of a large number of transit cars of softwoods that had for a time the effect of congesting distributing centers has almost eliminated the speculative factor, with the result that both mills and wholesalers are insisting that prices are about as low as they can be expected to go despite other conditions that might contribute to either a decline or advance. It is true that price concessions are being made here and there on a few items of softwoods for which demand is light and supply abundant, but in the main prices are firm throughout the list. In fact, along the entire Atlantic seaboard there is a strengthening tendency, North Carolina pine in particular being in very active demand with prices better than they have been for quite a while. That condition does not extend to the lake region, however, where considerable 'bargaining' is reported, nor to the central west, where retail dealers are still waiting for farmers to get in a better buying mood. Conditions along the Gulf and Pacific coasts show no change of consequence. The transportation situation is still a disturbing factor, but with no prospect of immediate relief so far as the railroads are concerned the lumber industry is accepting the situation as best it can and 'carrying on' in the same way, while being consoled to some extent by increasing orders from the railroads themselves for car and other materials.

"Conditions in the hardwood branch of the industry are about the same as they have been for some weeks, which is to say that both production and shipment are suffering from inadequate transportation facilities, demand is still good and price fluctuations are still upwards."

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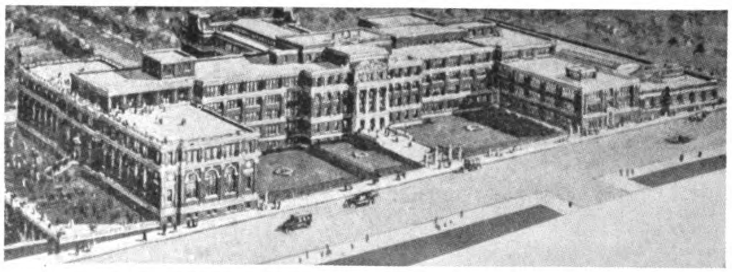

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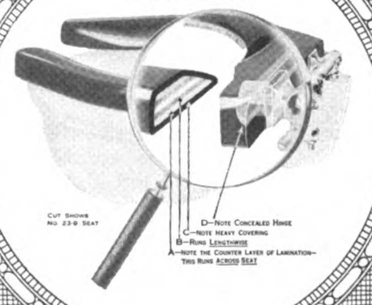


Manufacturers' Catalogs and Business Announcements

CATALOG REVIEWS

DAVID LUPTON'S SONS CO., Philadelphia. "Steel Windows." Catalog 110.

The attention which is being given to the windows used in buildings of many different types is one of the secrets of the buildings' success. This is particularly true of schools, where windows must nowadays often conform to certain well defined requirements, of factory buildings and sometimes of hospitals, where in order to admit the necessary light and air large wall areas are often given up to windows which must be easily manipulated in order to be practical. All this has meant the increasing use of steel sash, and their obvious advantages are now causing their wider use in residences, apartment houses, office buildings and for certain modern types of store fronts. The chief advantage of steel over wood for use in windows lies of course in its strength, making possible a slender steel muntin which notwithstanding its slenderness possesses far greater strength than a wood muntin many times its size, with consequent advantages for admitting light; the same strength and the fact that a steel sash is welded into one solid piece of rolled metal provide a rigidity which precludes the danger of its being blown in or twisted from its setting by the force of the wind; it is also close-fitting and free from rattle.

In this booklet the manufacturers of several types of steel windows emphasize the value of their products for buildings of different types, particular stress being laid upon their "projected windows" which are especially useful since they may be opened in several ways, secured in a number of positions, and easily reached for cleaning upon both sides. The booklet also contains detailed drawings illustrating the requirements where such windows are used in walls of wood, concrete or brick. Although chiefly devoted to the subject of "Steel Windows," more or less information is given regarding other products of the company, such as counter balanced sash, pivoted sash, pressed steel door frames, toilet partitions, shelving and factory equipment.

RUSSELL & ERWIN MFG. CO., New Britain, Conn. "Catalog of Hardware, Volume 13." 382 pp., 8 x 10¾ ins.

There are few details of interior finish which are more important in the average building than its hardware, which includes the locks and other metal fittings for doors and windows, wall fittings where electric bells and signals are required, hooks for closets and wardrobes and the metal letters and numbers which are useful for various purposes. This substantial volume is the latest of a series of catalogs which list for the convenience of architects and builders the many patterns and sizes in which the widely known "Russwin" products are made.

The growth of good taste in building is illustrated in the constant improvement in the design of the details which are used in building equipment, and is proved by the definite tendency toward the use of period design which is evident in this volume. There are none of the historic styles of architecture likely to be used today for which well designed hardware is not illustrated, emphasis being placed upon patterns in styles sure to be the most used, such as the colonial, the Georgian and the Adam, and the simpler forms of Louis XVI.

It is necessary in correctly estimating the hardware for buildings to have a complete knowledge of the requirements, and essential, therefore, to have an accurate list or "schedule" of all the hardware needed. The contractor estimating this item is almost always obliged to compile such a schedule from the architect's blue prints and specifications, and in the preface to this catalog there are given some directions which should make for accuracy in compiling such schedules.

ANNOUNCEMENTS

Brentwood S. Tolan, architect, formerly of Fort Wayne, Ind., is now associated with De Curtins & Rawson under the firm name of De Curtins, Rawson & Tolan, with offices at 503 Opera House Block, Lima, Ohio.

Jacob Weinstein, architect, has removed his offices to the Metropolitan Bldg., State and Chapel streets, New Haven, Conn.

Wellington J. H. Wallace, Bartlesville, Okla., announces his appointment as architect for the Baptist Sunday School Board, of Nashville, where he will be located. Manufacturers' catalogs and samples relating to church and Sunday-school buildings are requested.

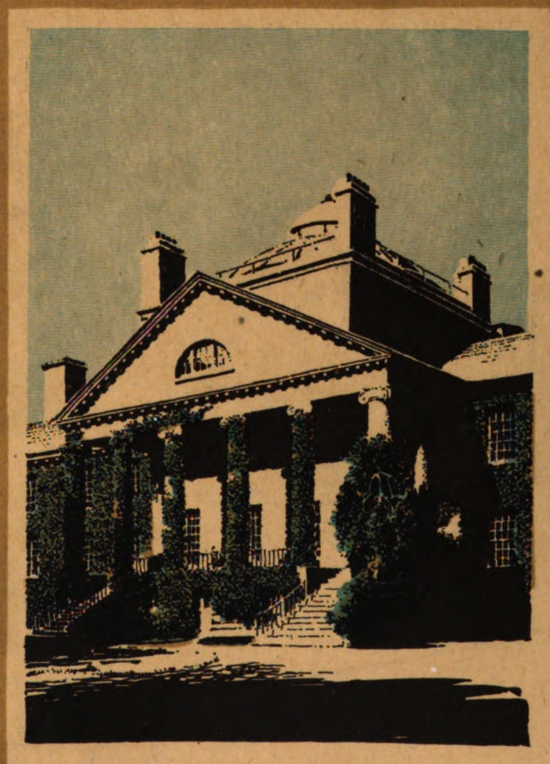
George Lawrence Smith, architect, announces the removal of his office to 5 Park street, Boston.

Harvey H. Warwick announces the removal of his office to 1108 Sixteenth street, N. W., Washington.

Norman Hatton announces that the partnership formerly known as Hatton, Holmes & Anthony has been dissolved. Mr. Hatton will continue the practice of his profession at the same address, 321-2 O. R. C. Bldg., Cedar Rapids, Iowa.

Smith, Hinchman & Grylls have moved their offices from the Washington Arcade Bldg. to the 8th floor of the Marquette Bldg., 243 Congress street, Detroit.

THE ARCHITECTURAL FORUM



DECEMBER 1922

HOSPITAL REFERENCE NUMBER

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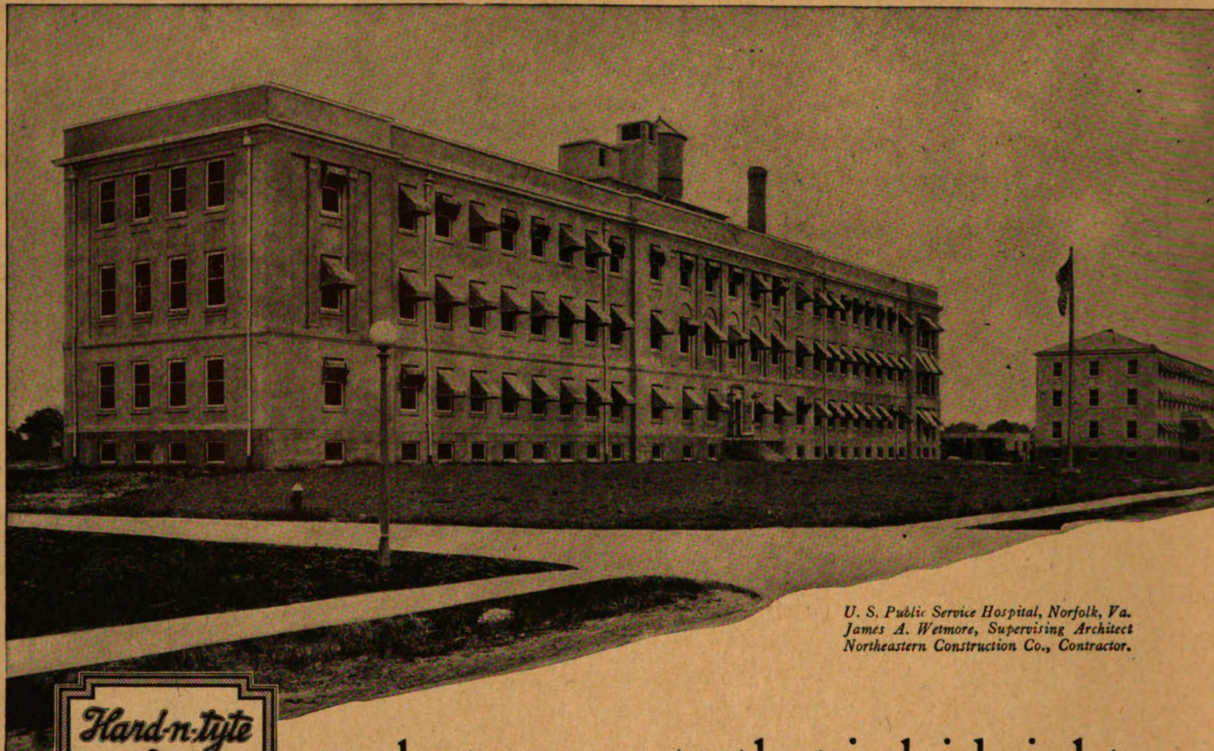

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BOOK DEPARTMENT

CEMENTS, LIMES AND PLASTERS; Their Materials, Manufacture and Properties. By Edwin C. Eckel, C.E. Second Edition, 655 pp. Price $6.50 net. John Wiley & Sons, New York.

SINCE the use of those non-metallic structural materials which are grouped under the broad heading of "cementing materials" is being constantly widened, anything which relates to the materials themselves or to their use is certain to be welcomed by architects and engineers. Under this heading may be included not only the hydraulic cements proper but also a long list of allied materials among which are plasters and lime. With the intensive study which has been given to these materials and to the advances in technology resulting from such study it has become possible to supply them in uniform and higher grades and at prices which are sufficiently low to justify their ever-extending use.

This work is a second edition of Mr. Eckel's volume which appeared in 1905, issued now in a new edition largely because of the changes which have taken place in the production of the materials concerned. In the preparation of this new edition the original work has been revised and partially re-written, and it includes reference lists and statistics necessary to bring the text into accord with current knowledge and practice, while about 100 pages of wholly new matter have been added. Considerable attention has been given to the development of the manufacture of these materials in Canada and foreign countries, and because of the growth in its manufacture the sections dealing with Portland cement have been enlarged and several hundred analyses have been added to cover points of particular importance relating to raw materials and to fuels. The author deals with an intricate and complicated subject in a way which is as non-technical as possible considering the nature of his topic and the fullness with which he treats of the composition and manufacture of these materials. Maps are given upon which are indicated the localities in which gypsum and other deposits necessary for their manufacture are found or at which there have been built mills which form centers of the industry. After dealing with the apparatus required for their manufacture space is devoted to the composition, properties and tests of plaster and other substances intended for different uses. In considering a material which is used in vast quantities in building and engineering of so many kinds, the prices at which it is to be had are highly im-

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portant. The prices at which such products are to be purchased depend in large measure upon the costs of other materials, such as fuels of different kinds which enter into the cost of production. Mr. Eckel feels, in view of present conditions, that we shall not get back to the cost level of 1900 for perhaps 20 years, and he doubts if the low level established in 1896 and 1898 will ever return.

This work is perhaps too widely known to require an extended review and still less an estimate as to its value, but it may be said that in this new edition the book possesses every valuable feature of the original with the added value of revision which brings its data into conformity with present-day uses and conditions.

THE DEVELOPMENT OF EMBROIDERY IN AMERICA. By Candace Wheeler. 152 pp., 6¼ x 9½ ins. Price $5 net. Harper & Brothers, New York.

GREAT is the debt which architecture owes to the arts which have contributed to the magnificence of her triumphs, and among these ancillary arts that of needlework takes important rank. The art, as written of here by one long known as a leader in certain kinds of decorative art, includes needlework in a wide variety of forms, from actual embroidery, the word used in the title of the book, to work of such a wholly different nature as tapestry, which since it is wrought upon a loom is more often regarded as belonging to the art of textile weaving. Many of the sub-divisions of needlework which are discussed in these pages have through the centuries been used in connection with interior architecture, and designers well know the value of needlework as hangings, as panels for screens, or as coverings for chairs, stools and sofas.

MODERN FURNITURE DESIGNS ADAPTED FROM THE ENGLISH PERIODS. 46 pp., 16¾ x 11 ins. Price $8. John Tiranti & Co., Tottenham Court road, London, W.

THE interest in architecture, decorating and furnishing of definite periods leads to the use of the various English types many who recognize their suitability for use today, but unfortunately some who approve in principle of the use of period design are unwilling to use such precedent in its integrity and insist upon making certain alterations or "adaptations" in the design which mar, or more frequently ruin, its entire character. One frequently sees in the shops pieces of furniture obviously based upon excellent examples of English, French or Italian furniture of definite periods quite spoiled by some change in the design which the manufacturer evidently thought necessary to insure its popularity, though it may be doubted whether in tinkering with the design and trying to please both those of well grounded taste and those to whom the "popular" appeals he has not missed pleasing either.

In this book there is much to praise in that it contains some patterns of furniture well worthy of reproduction, but the trained designer could hardly be expected to approve of certain patterns in which grave liberties are taken with design of say the Jacobean and Queen Anne periods, liberties taken no doubt with a well meaning desire to elevate the public taste by persuading people to adopt better design. The trouble is that such design is not enough better to make amends for the serious injury done to good taste by the alterations involved, in which period furnishing and decoration suffer.

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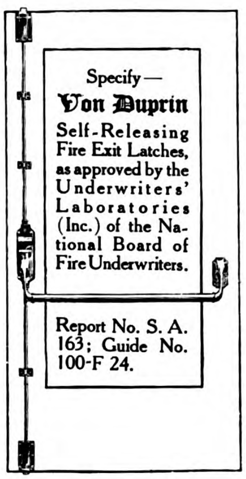

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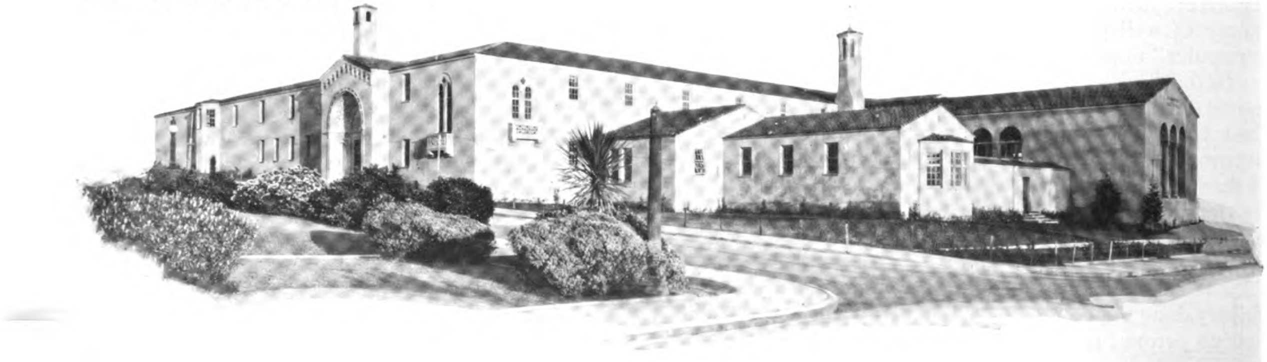

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CONTENTS for DECEMBER 1922

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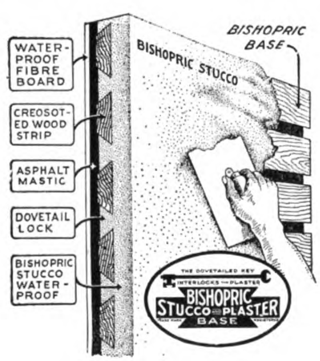

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THE EDITOR'S FORUM

HOSPITALS AND ARCHITECTS

THE development of this Hospital Reference Number of THE ARCHITECTURAL FORUM necessitated establishing a close contact with many hospital projects, both completed and prospective. This contact brought to light several interesting trends in the hospital field which are of importance in their relation to the profession of architecture.

Perhaps the most interesting fact is that the hospital building has passed forever out of the class of grim, ugly structures representing the dire necessities of communities, and into a class of important institutional buildings requiring definite architectural expression and design. We find today hospitals not only for emergency cases nor alone to meet the necessities of persons of limited means, but providing suitable accommodations for all types of medical and surgical service and for convalescence and recuperation.

The service of the architect is not limited to meeting these requirements, for it has been found that through close co-operation with the hospital officials and with consulting specialists in various types of mechanical and service equipment required in the hospital, the architect is enabled to render an invaluable service in correlating all phases of hospital activity and incorporating these in the planning of the building to produce a structure entirely efficient of purpose. Thus we find architectural organizations often rendering an unusually complete service which involves the selection of all service equipment as well as the materials and mechanical equipment for the building.

In relation to all types of institutional buildings, the service of architects is broadening in its scope. The architect, because of the nature of his profession, is in a position to study any institutional problem from an interesting point of vantage. He can survey the field represented by any class of buildings with a practiced eye and glean from the experience of others valuable practical data to apply to any given problem. He is also in a position to know of the latest developments of structural practice and mechanical installations, so that with the needs of the institution definitely expressed by its directors and officials, he may make valuable suggestions, and often interpret the future of the building in terms of structural preparedness.

Full realization of these facts is rapidly developing in all institutional fields where building requirements are specific and involve large expenditures of money. This broader form of architectural service is in fact creating a definite impression in the business world, and today, as never before, the importance of the architect's position in the economic world is receiving public recognition. There are two reasons for the development of this very desirable condition. The first and by far the more important reason is the acceptance by many architects of the broader responsibilities involved in rendering complete professional service, which includes not only the ability to produce attractive and practical buildings but to thoroughly appreciate the business of the institutional problem of the client and, second, to meet these needs by a well developed advisory service.

It has been said that the future is only history repeating itself, and to read the future of the architectural profession requires only an analysis of past performances. The success which has attended the invaluable service of architects who have given thorough study to institutional needs as evidenced by the hospital buildings and data presented in this issue, constitutes a definite guarantee for the future of all architects who give serious consideration to the specific business and service problems involved in the design and equipment of institutional, commercial and investment structures.

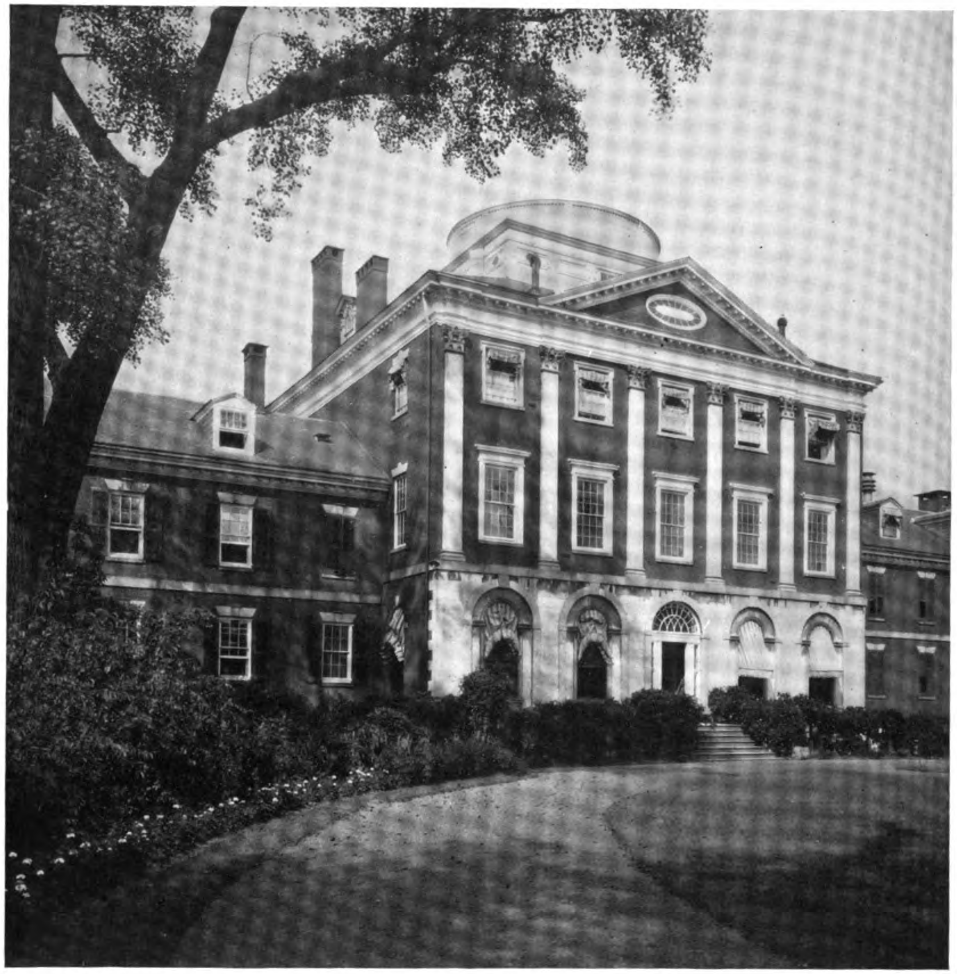
THE FORUM'S 1923 BUILDING SURVEY

THE annual building survey and forecast of THE FORUM has just been completed and will be presented in the January issue. It is interesting to know, however, that the returns on this survey indicate that 1923 will be the greatest building year of history. The hospital field reports indicate that upward of $200,000,000 will be invested in hospitals during the next year. In fact, in all types of institutional buildings strong activity is shown. The reports on industrial buildings indicate continued activity in this field, together with growing requirements for architectural service. Industrial building activity next year will be marked by factors of permanency and structural character in the types of buildings required. Other important building fields reflect great activity in this survey.

CHICAGO TRIBUNE COMPETITION

ANNOUNCEMENT has just been received through press dispatch as follows: John Mead Howells of New York, son of William Dean Howells, novelist, won first prize in the Chicago Tribune's $100,000 competition and thus becomes architect of its new building, to be erected at 431-439 North Michigan boulevard, at a cost of $7,000,000.

His immediate fee is $50,000. Associated with him in preparation of the design was Raymond M. Hood of New York.



CENTRAL ADMINISTRATION PAVILION
THE PENNSYLVANIA HOSPITAL, PHILADELPHIA
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The
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VOLUME XXXVII DECEMBER 1922 NUMBER 6

Modern Hospital Design

By RICHARD E. SCHMIDT, F.A.I.A.
Richard E. Schmidt, Garden & Martin, Architects, Chicago

THE planning of a hospital should not be begun until its *modus operandi*, present and future, is determined by the medical directors of the institution. The building plan must accord with the operation if it is to be a successful hospital; obviously, it is very difficult, almost impossible, to operate a hospital properly in an unsuitable building.

After the program of the proposed hospital has been framed, the superintendent and a physician who has had hospital experience should co-operate with the architect in developing the building plan in all its details in co-ordination with the plan of operation. If the hospital is to be a large and important structure, the operating engineer should be appointed early during the construction of the building, since it is obviously important that he understand all of the intricacies of the mechanical equipment.

The General Hospital. The scope of the modern hospital of this class is not as broad as its name implies. The general hospital of the middle of the last century accepted patients having any ailment or requiring any medical or surgical service. Today general hospitals, with the possible exception of some of the largest municipal institutions, do not undertake to treat insane, contagious or tubercular patients, or else they are equipped to care for only a limited number of persons suffering from those ailments and for only a few hours or days until they can be transferred to special hospitals. General hospitals furnish medical service for adults and surgical service for adults as well as for children. The majority of general hospitals are not equipped or have very limited accommodations for giving service for the many ailments of childhood. Some obstetrical work is done in almost all of them.

Generally, the reports of past years of existing institutions which are to be enlarged or which are building new hospitals are studied and the subdivisions of the hospital are proportioned to the existing hospital and the number of patients treated therein, much the same way in which the industrial engineer designs a new plant for a going concern. He studies the production for several years, the rate of increase in each kind of product, the totals of costs and receipts to determine the profits in the several divisions, and with the owners decides which are likely to increase in the future and at what rate, and which are so comparatively unprofitable that it is not desirable to provide larger accommodations for them.

The patronage of the hospital in some kinds of cases depends upon the standing and popularity of the medical men in its service. In two hospitals of equal capacity, similarly subdivided, one department will grow at such a rate that it will absorb the space originally intended for another, while in the other hospital the accommodations for the same service will not be overcrowded, and the number of patients per day or year will remain about stationary. Inasmuch as the architect does not control the personnel of the staff and cannot anticipate in what respects it will change, he cannot give much advice regarding the most desirable division of the capacity or what provisions must be made for expansion.

In America the surgical service is developed to the greatest extent in the general hospital, and it manifestly functions in close relationship with many other sections, such as the operating department and the various laboratories. The internal medicine or medical section is of equal importance and makes large demands on the capacity and use of the laboratories and X-ray departments jointly with the surgical section.

Provisions must be made for giving X-ray and radium treatments, and the time may come when it will be necessary to provide equipment for others, such as oxygen or ozone, or pneumatic chambers for all of the forms of light treatment, such as ultraviolet and Finsen, brine, radioactive earth and balsam baths, many of which are used extensively in Europe and in private rest cures and sanitaria in America for the benefit of the wealthy, but which are beyond the reach of the poor. Provisions are made for obstetric and gynecological less frequently than for pediatric, orthopedic, eye, ear, nose and

throat, out-patient and isolation departments, and very rarely for genito-urinary, venereal, dermatological or neurological cases. The public hospitals of large communities must provide for all of these, but not necessarily in one building. A hospital for such a variety of purposes will generally be built on a cottage or pavilion plan. Large laboratories and X-ray rooms are required and will be described more in detail later on.

Hospitals for the Insane. Such hospitals have not been standardized to the same extent as other types, and it is difficult to find many good examples. Only recently mental cases were accorded the same treatment as criminals, *i.e.*, confined in cages and subjected to the gaze of the curious. These old institutions had massive walls and heavily guarded small windows high above the floor; courts surrounded by walls 12 to 15 feet high; no ornaments or flowers, not even benches. The cells, built in rows like an old fashioned menagerie, were closed by massive doors with little peek-holes. It is unnecessary to go into detail in the description of these arrangements, which no enlightened community would permit today, when every mechanical restraint is proscribed. The isolation of patients in cells is resorted to only in extreme emergencies and is prohibited as a regularly applied remedy.

Governmental custodial institutions are often designed for the reception of every category of mental disorder, from the more or less transient cases to the incurable. Unquestionably they should be subdivided for the treatment of the milder cases, chronics, feeble-minded or idiots, epileptics, criminal insane and alcoholics.

Obviously, large asylums should not be near large cities; however it is advisable to have them in the neighborhood of small towns, and consequently there ought to be small receiving hospitals, possibly branches of a general hospital, in large cities for the reception of patients and for the treatment of acute cases which at times can be quickly cured.

It is more economical to have the custody of both sexes at a large institution, inasmuch as it is beneficial to employ the patients whenever possible in some kind of work—the men in the fields, gardens and some of the shops, and the women in kitchens, laundries and sewing rooms. There should be wards for quiet, semi-quiet, noisy and bedridden patients, but no clear-cut division can be made.

No one would advise the construction of large corridor buildings, and almost as rarely the construction of large pavilions. Separate buildings or cottages for a limited number of patients seem to be most favored, and especially an unsymmetrical disposition of the various parts. The monotony of a group of buildings on axis is seemingly too trying for the inmates. The most successful institutions have separate buildings for cooking and feeding, entertainment and gymnastics, infirmaries for bed cases and separate houses or cottages for groups of patients segregated and selected by the medical director. Sometimes pavilions or cottages are connected by covered passages for the convenience of the management and medical staff, but it is best if such connections are few.

The planning of every institution for the insane is such a special problem that it is impossible to attempt to describe it in detail in the limits of this article. Furthermore, the opinions of psychiatrists vary so widely that the medical director should supply the architect with a program for the technique of operation.

Permanent or flowing water baths are such an important element in the quieting of almost every kind of mental disorder that they are especially mentioned. They should be placed in the receiving and every other station.

Contagious Hospitals. In designing a hospital for the treatment of communicable diseases, the principle that such diseases are passed from one person to another by direct contact and are not borne through the air is recognized; however, a hospital arranged just as any other acute disease general hospital is designed, can be used as a hospital for contagious diseases fully as well as a specially designed building if the prevention of cross infection is left entirely to the technical methods employed; but it seems undesirable to do this unless it is in the sole charge of one physician with full-time assistants, graduate nurses retained over long periods, orderlies and maids paid enough to insure their permanent employment.

When this is assured, the technique of treatment should be made obvious, *i.e.*, by physical segregation, by barriers and the almost compulsory use of articles which indicate their intended function to compel attendants to perform certain duties. A room, fixture or article is provided for every step. Arrangements should be made by which the physician, patient or nurse may clean up and leave the premises without carrying any of the elements of infection. The building should be divided into units which can be entered without passing through another, and each such unit should comprise one or more single-bed rooms and one or more small wards, patients' bath, toilet room, nurses' room, nurses' bath and toilet, pantry or kitchen and sterilizing rooms. These units should be so grouped that two or more can be joined into one unit for treatment of one disease.

Food, laundry, heating and other service will be furnished from central plants, and provisions must be made to sterilize linens, dishes, garbage and other things before they leave the building. Some of this can be done by submerging the articles in tanks containing disinfecting solutions. Provisions must be made for change of clothing by the physician after the examination of every patient, and for bathing before leaving the building.*

Tuberculosis Hospitals. The limits of this article

* The article on "Hospitals for Communicable Diseases," published in *Modern Hospital*, March, 1918, by the writer, illustrates a number of plans designed on these principles.

permit of mentioning only a few salient points. After the general requirements of topographical features, shelter from prevailing winds, climatic conditions, water and power supply, soil and drainage facilities have been determined, the preparation of plans can be begun. These have been standardized by the National Association for the Study and Prevention of Tuberculosis and the U. S. Public Health Service. It is important that any natural beauties of site be preserved in laying out the building scheme, since pleasant surroundings are undoubtedly a factor in the treatment of tuberculosis patients because of its tedious nature.

The patients must be protected from prevailing disagreeable winds by rising ground behind buildings to the north, or by belts of trees, preferably evergreens. Patients' buildings should face a little to the east of south in the colder zones. There must be quarters for acute, semi-ambulant and ambulant cases respectively, as well as for all of the services. In small institutions, they are often provided for in two or three buildings. Assembly or recreation hall and rooms for occupational and prevocational therapy are required in a modern sanitarium.

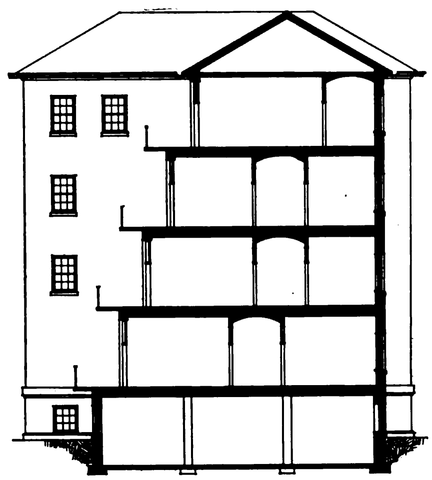


Fig. 1. Cross Section, "Das Feilufthaus"
D. Sarason, Designer

Acutely ill patients are housed in the hospital or infirmary, and as their conditions improve they are transferred to the semi-ambulant building, and later to the ambulant as they progress towards recovery, finally being housed in still more separate quarters. The passing from one building to another has an improving psychological effect on the patient. The accommodations provided for hospital patients in modern sanitaria differ but little from those of the modern general hospital, the chief difference being that for at least 50 per cent of the patients provisions should be made for open air sleeping on porches.

The buildings for ambulant patients should not be designed on the open ward principle, but should be arranged to give some privacy to the inmates.

It is well to arrange a receiving ward or wing in the hospital building, in which newly admitted patients can be observed in bed for a week or two for diagnosis and classification.

"*Das feilufthaus*," literally translated as the "open air building," a system devised by Dr. D. Sarason of Berlin, is an interesting development of buildings of permanent construction for the treatment of tuberculosis patients on sites of limited areas. The cross section, Fig. 1, illustrates Dr. Sarason's system.

Obstetrical Hospitals. A modern maternity hospital is almost as complicated as the most complete general hospital and is not the simple lodging house generally pictured by the uninformed.

Notwithstanding that the danger of infection with which medical and surgical wards of general hospitals menace a maternity department does not exist in a maternity hospital, there will be infected cases which must be isolated by architectural and administrative methods which will reduce the danger to a minimum. Entering cases should be taken to an admitting room for observation. Frankly suspicious cases should go to an isolation pavilion which should be built and equipped very much like a contagious hospital. Slightly doubtful cases should be delivered in an adjoining room, and non-suspicious cases in the main delivery rooms. If, in the main department, mothers and babies develop infectious symptoms, they should at once be removed to the observation department, or if it is serious to the isolation building. A room for individual incubators with separate filtered air intakes and exhaust fans, also a room for "graduates" of the incubators, are necessities. Insulated, temperature and humidity regulated incubation wards or *couveuses* would seem to afford more satisfactory conditions than individual portable incubators, but certainty of proper results does not appear to be assured.

In addition to the usual teaching rooms, the nurses' training department should have a manikin room for the teaching of operative obstetrics on a rubber figure, and an X-ray laboratory, mainly for picture work.

Surgical Hospitals. In the surgical hospital it is possible to arrange the various parts in a much more suitable order for efficient and scientific technique than it is in a general hospital, in which many of the parts must be used by a number of departments or services. The X-ray, microscopic, chemical and other laboratories can be placed in juxtaposition to the operating rooms, as well as the plaster rooms and the machines for muscular reeducation. The surgical dressing rooms, and in fact the rooms and apparatus for every activity of the surgeon, can be in one pavilion or inside of four walls, completely segregated from the ward or nursing rooms. Every known method, instrument or performance which is required for a successful operation can be placed at the side of the operator for immediate employment.

Surgeons are not unanimous regarding the placing of groups of surgical dressing rooms adjacent to the operating departments or of distributing these on the ward floors, or as to whether the scrub-up work

and anesthetizing should be done in the operating rooms or in special rooms. Central water sterilizing plants are operating satisfactorily in some institutions and have been abandoned in others; in a few large hospitals surgical dressings are prepared and sterilized away from the hurry, bustle and heat of the operating department. Many hospitals salvage and re-sterilize large quantities of used gauze, while others prefer to destroy it in incinerators. The architect must be guided by the surgical staff's preference in these matters.

Only a high tray bath with a flexible spray is useful in an accident or emergency receiving department, which should also have its operating room where its use will not interfere with the ordinary work of the hospital or provide distraction to disturb the regular patients.

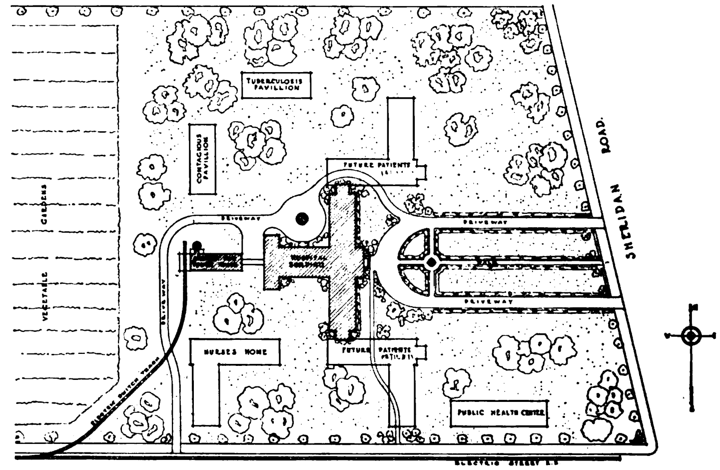


Fig. 2. Plot Plan, Victory Memorial Hospital, Waukegan, Ill.
Richard E. Schmidt, Garden & Martin, Architects

Children's Hospitals. In the case of the children's hospital it seems more necessary than in any other kind that it be readily accessible to the friends and relatives of the patients by cheap means of transportation. It is equally manifest that children's hospitals should be surrounded by the most pleasant conditions and not by industries or railways. Grounds and orientation should permit of many open and enclosed porches in close proximity to the wards. The danger of contagion and cross infection among children must be guarded against from the entrance of the hospital, the reception rooms and every other room. The auxiliary rooms which they do not frequent are in general similar to those required for general hospitals.

New patients are placed in observation or isolation wards until the periods of incubation of various children's diseases have passed. In these and other wards the patients are separated by glazed partitions. The resulting small areas are generally termed "boxes" or "cubicles." These partitions are usually only about 7 feet high and do not extend to the floor. Lavatories should be numerous, so close to each cubicle that physicians and nurses can wash their hands without delay after leaving a child. In some hospitals every cubicle has a complete equipment for use only in that cubicle by the physician, the nurse and the patient; one cabinet for the physician's, one for the nurse's and another for the patient's articles, and every article bears the number of the cubicle.

Children's beds vary in size from 2 feet by 3 feet 8 inches to 3 feet by 6 feet and larger. The *bassinets* in creches for nurslings are generally about 14 inches by 24 inches or 15 inches by 30 inches; however, they are also made in much larger sizes.

If there are no ordinary private rooms, a quiet room should be arranged in connection with every ward for the use of very sick children; there should be pleasant rooms with all the accommodations of a dwelling for the wet nurses, and a separate nursery for their children.

Porches and solaria should be divided from the wards by French windows to permit rolling beds from one to the other. Roof wards for sun and air treatment are very desirable on hospitals in congested districts, but wherever location and ground area will permit it

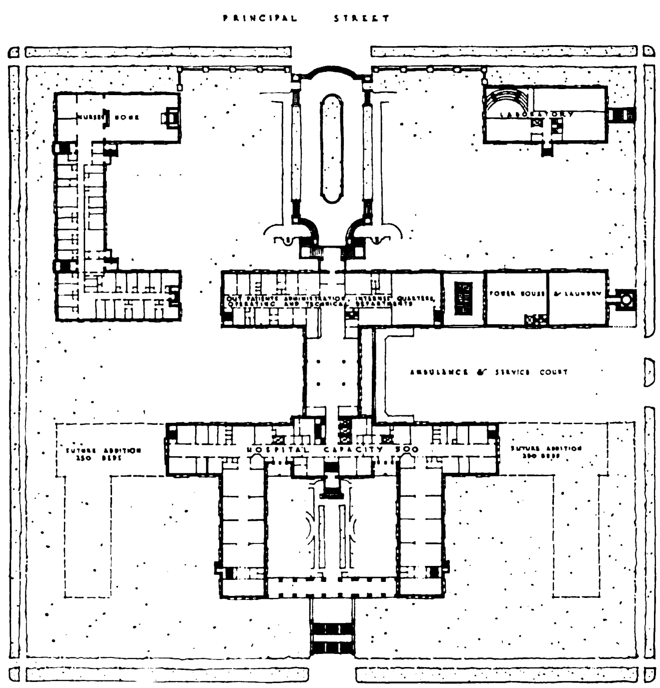


Fig. 3. A 500-bed Municipal Hospital
Designed for ultimate capacity of 1,000 beds
Richard E. Schmidt, Garden & Martin, Architects

seems better to build low buildings and paved, awninged and screened terraces in a garden.

A roomy photographic gallery is valuable for increasing scientific knowledge. If there is a clinic or lecture hall attached to the hospital it is best that there be a separate entrance for students and two entrances for patients, one of these for children with communicable diseases. There should also be preparation rooms for the children in connection with the lecture halls.

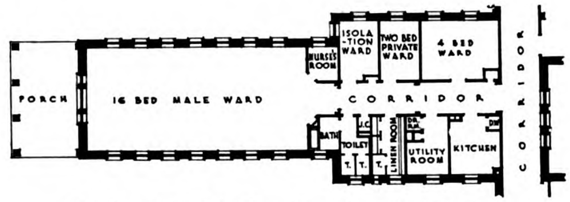


Fig. 4. A Ward Pavilion; 80 sq. ft. per Bed in Ward; 155 sq. ft. per Patient in Pavilion

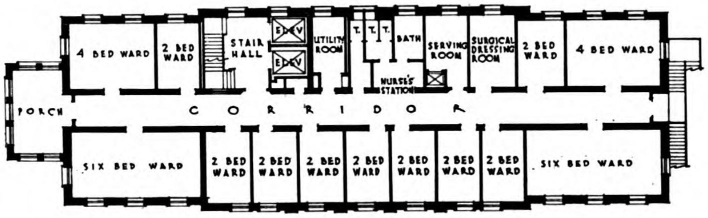


Fig. 5. A Mixed Ward and Room Unit; 80 sq. ft. per Bed in Wards; 157 sq. ft. per Patient in Rooms

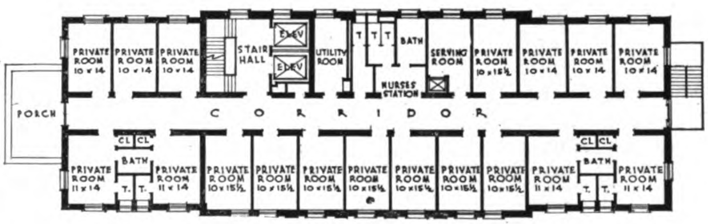


Fig. 6. A Floor of Private Rooms with Common Auxiliary Rooms; Effective Areas 140 sq. ft. and 155 sq. ft.; 267 sq. ft. per Patient per Floor

Plot Planning and Provisions for Future Growth. Notwithstanding that the founders of a hospital may believe that the institution they propose to build will serve the community and fill all of the requirements that the science of medicine may require for many years, it is obvious that it would be unwise to build without preparing a rough study of the ultimate possibilities of the entire site or of land which it may seem reasonably possible to acquire in the future, adjacent to the site (Figs. 2 and 3). It will not be necessary to develop elevations and details or attempt to anticipate the advances in medical science which will unquestionably occur, but only to prepare a scheme with properly oriented buildings having convenient circulation, each building of adequate size to provide the auxiliaries and services in their proper proportion as known today, also space for the enlargement of the housekeeping services, such as the heating plant, kitchen and laundry, and the enlargement of the administration, operating and laboratory facilities from time to time as the buildings designed for future construction are erected.

It is necessary to remember that some of these departments cannot be enlarged but will have to be converted for other uses, and it would be better to design for perfect functioning in the completed plan than it is to do this in the first portion to be built if it is not possible to do both. Because of this, comparatively small kitchen, laundry and heating units may be placed in the first unit or in inexpensive additions, and moved to separate buildings when the use of these services is greater than their original or temporary dimensions will permit; but as in many other elements, every problem cannot be solved on the basis of the same principles. Low buildings, high buildings, city and country institutions, present varying problems and solutions. The space occupied by wards in the first unit can easily be converted into private rooms or *vice versa.* Ward buildings, private buildings, obstetrical, children's, and buildings for other special purposes can be added from time to time when the portions of the original unit used for these purposes are crowded beyond their capacity, but the possibility of converting some parts of the original units to other uses should be studied during the preparation of the original drawings, notwithstanding that no one can anticipate which department will first crowd its limits.

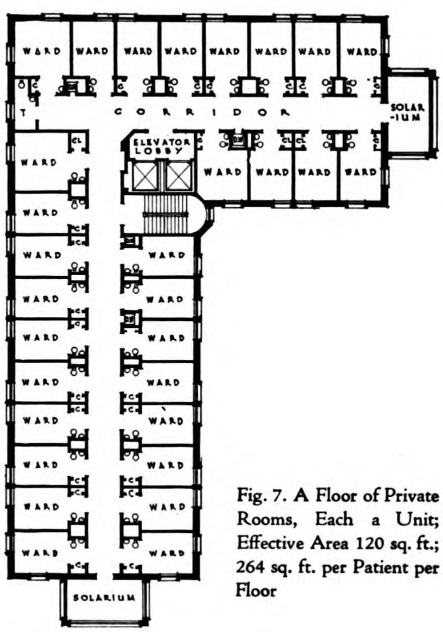


Fig. 7. A Floor of Private Rooms, Each a Unit; Effective Area 120 sq. ft.; 264 sq. ft. per Patient per Floor

Private Rooms versus Wards. It cannot be denied that ward service can be furnished at a lower cost than private room service, or that the cost per bed is less for ward beds than it is

Doctors' Lounge and Library, Evanston Hospital, Evanston, Ill.
Richard E. Schmidt, Garden & Martin, Architects

for beds in single or private rooms (Fig. 4). One nurse can provide good service for eight or ten ward patients, all of whom she can observe while in the ward. Patients can ask for water, utensils or other things, and they can be furnished with the least loss of time, but when every patient is in a single-bed room the nurse will be within the sound of the voice of only one patient at a time, and she cannot render the same service to as many different rooms as there may be beds in a ward (Fig. 5). Obviously, the cost of a hospital consisting wholly of private rooms would increase in a greater ratio than the simple proportion of the larger cubic contents of that kind of a hospital to the contents of a hospital in which all of the patients are in wards (Fig. 6). Pantries, duty rooms and other auxiliaries required for proper technique can be grouped closer on the average to each bed in a ward than they can to the same number of beds in private rooms, which is another factor which increases the cost of services.

Every hospital should furnish service to any good citizen who applies, no matter what station he may occupy, but as patients' means are not alike, the poor cannot be expected to pay the same charge as the rich; at least our customs do not permit charges of different amounts for identical accommodations and service.

While the service is practically the same, well-to-do and rich patients are given better accommodations and are for that reason perfectly willing to pay high enough rates to leave an excess over the actual cost of the service furnished to them, which excess usually covers the loss suffered by the hospital in giving accommodations and service to poor patients for no charge or at a charge below actual cost. Therefore, there appears to be ample reason for providing wards notwithstanding that it is ideal to give every patient a private room and afford him the quiet and privacy of that arrangement.

However, private rooms can be arranged to have every auxiliary service, making each room a complete unit with all of the equipment usually provided for a unit of rooms (Fig. 7). Each room can have a water closet with a swinging water spout to function as a slop sink, a bath tub or shower, lavatory, medicine case, bedpan rack, refrigerator for food or specimens, cabinet for extra linen, clothing, private porch, etc., either connected to a service story or basement by dumbwaiter or by one dumbwaiter in common with two or more rooms, by means of which food and other things which it may be more advisable to prepare or store in a central place can be delivered, but it needs no argument to appreciate that that kind of a building will cost considerably more per unit than one of the more ordinary types in which many of the auxiliaries mentioned are provided in separate rooms or spaces for a group of private rooms.

Plumbing Changes and Simplification. Very few, if any, new types of plumbing fixtures have appeared recently. Possibly more fixtures have been made for wall hanging to eliminate supporting legs. This change with the growing use of materials for pipes and cocks which do not require polishing and the elimination of concealed overflow channels above the trap water line are the principal changes. As a whole the tendency is to simplify fixtures. Inasmuch as bath tubs are almost useless in a hospital, shower baths are taking their place as being more sanitary and space-saving; furthermore, they seem to the wealthy patient sufficiently desirable to justify the rental of a bathroom.

The cost of repairing floors and walls of fireproof buildings resulting from replacement or repair of pipes is so large that the accessibility of piping is being given much greater attention than formerly. Shafts of fire-resisting materials with metal doors and removable marble floor slabs cost so much more than board panels and floors with wooden covers that it is a serious problem. Large and convenient pipe shafts can be built where plans of the several floors are alike, and piping can be repaired or replaced at a minimum cost; but where the floor plans are not alike and it is necessary to build horizontal passages, the cost is almost prohibitive and the use of brass or other non-corrosive metal or the installation of apparatus for removing the corrosive element from water must be made use of.

Increasing Demand for Laboratories. The hospital has materially widened its scope during recent years, and today instead of being merely a nursing establishment, it is in many instances a center for the study of medical sciences, for promoting research work and for the teaching of medicine, a position which the hospital must logically keep if it is to develop fully its usefulness to the community and to the physician.

The large and important national organizations

of physicians have long recognized that a hospital can be of the greatest help to the individual patient, community and race if a laboratory is used as an instrument of diagnosis and of the follow-up treatment; consequently these organizations have brought much pressure to bear on hospitals to provide well equipped laboratories, not merely to carry out routine urine analyses, but to do bio-chemical work, to make proper metabolic studies, and studies in basal metabolism, nitrogen and carbohydrate balances, as well as to correlate the work of the serological, pathological and bacteriological laboratories.

A proper arrangement for a large hospital should provide for these different departments:

Administration, record room, small reception room for patients, director's laboratory, and a reading room for the staff. A bacteriological laboratory with media and incubator rooms should be provided, and a separate room for serology, or else this may be combined with a bacteriology room or with the bio-chemical laboratory. A sterilizing room, tissue room, pathological museum, animal room, animal operating room, individual research room, a photographing room and dark room. A well lighted and ventilated autopsy room and a morgue should be located conveniently to the laboratories without any inconvenience to the pathologist, his assistants and technicians.

In hospitals connected with teaching institutions an amphitheater autopsy room will be required. The X-ray department, cystoscopic examination, electrocardiograph rooms, and a room for the estimation of basal metabolism and other examinations can be grouped with the laboratories or placed in the same building to great advantage for the complete examination of patients and the efficiency of the staff.

Recent Changes in Food Service. In comparatively small hospitals food can be served directly from the kitchen to patients, palatable and hot, as it is in a family home, but in the development of food service in the hospital it has been found that as the patient capacity increased it was necessary to convey the food from the kitchen to steam tables on the several floors to serve food hot. Notwithstanding that the quality of the food suffered from remaining on steam tables too long, no other method was employed until the introduction in recent years of two new methods. One of these is a development of the original method of serving the food directly from the kitchen to the patient, by providing a large serving room adjacent to the kitchen, installing a separate large automatic dumbwaiter

The Hospitable Lobby of Evanston Hospital, Evanston, Ill.
Richard E. Schmidt, Garden & Martin, Architects

for each floor, and setting up the trays in the serving room in a systematic manner by a large number of people, each one of whom has a particular duty to perform. The trays are set up on carts in the serving room, and a short time before the meal hour every person appears at his station in the serving room and the work is begun by first placing all of the cold food articles on the trays; the carts are moved around the room, the hot dishes being served when the trays or tray carts are otherwise ready to place on the dumbwaiters and be lifted to the respective floors where the nurses are waiting to deliver the trays to their patients. It can be seen that it requires careful oversight, training and considerable essential equipment to insure constant satisfactory functioning of this form of food distribution.

Another form of satisfactory and efficient food distribution requires the use of thoroughly insulated food conveyors or carts by the use of which food, fully as palatable and as hot as it would be if served directly from the ranges, can be served at a long distance from the kitchen and a long time after it has been cooked. These conveyors are arranged to convey food in bulk or on plates in racks; both are made with shelves for soiled dishes, and the bulk food conveyor also has shelves for clean dishes. While it is possible to carry cold and hot food in the same conveyor, it is better to have separate conveyors, for one large enough to carry all that is required of both kinds would be unwieldy.

Food can be served from the bulk conveyors in the wards or at the doors of private rooms, but in doing this the odors of cooking will be spread through the building; it consequently seems to be necessary to compromise and to provide a serving room adjacent to the food cart or freight elevators, in which the food can be transferred from the bulk food conveyors to the trays. While it would be possible to omit the serving rooms altogether, it is probably better to have them and to equip them in the usual manner with refrigerators, sinks, hot plates, dish closets, etc., for night and other special food service, and with coffee and milk urns if the station serves a large number of patients.

Efficient food conveyors or carts are built on the principle of the fireless cooker, in which the flavor of the food is conserved and not dissipated; consequently they furnish a more satisfactory service than steam tables.

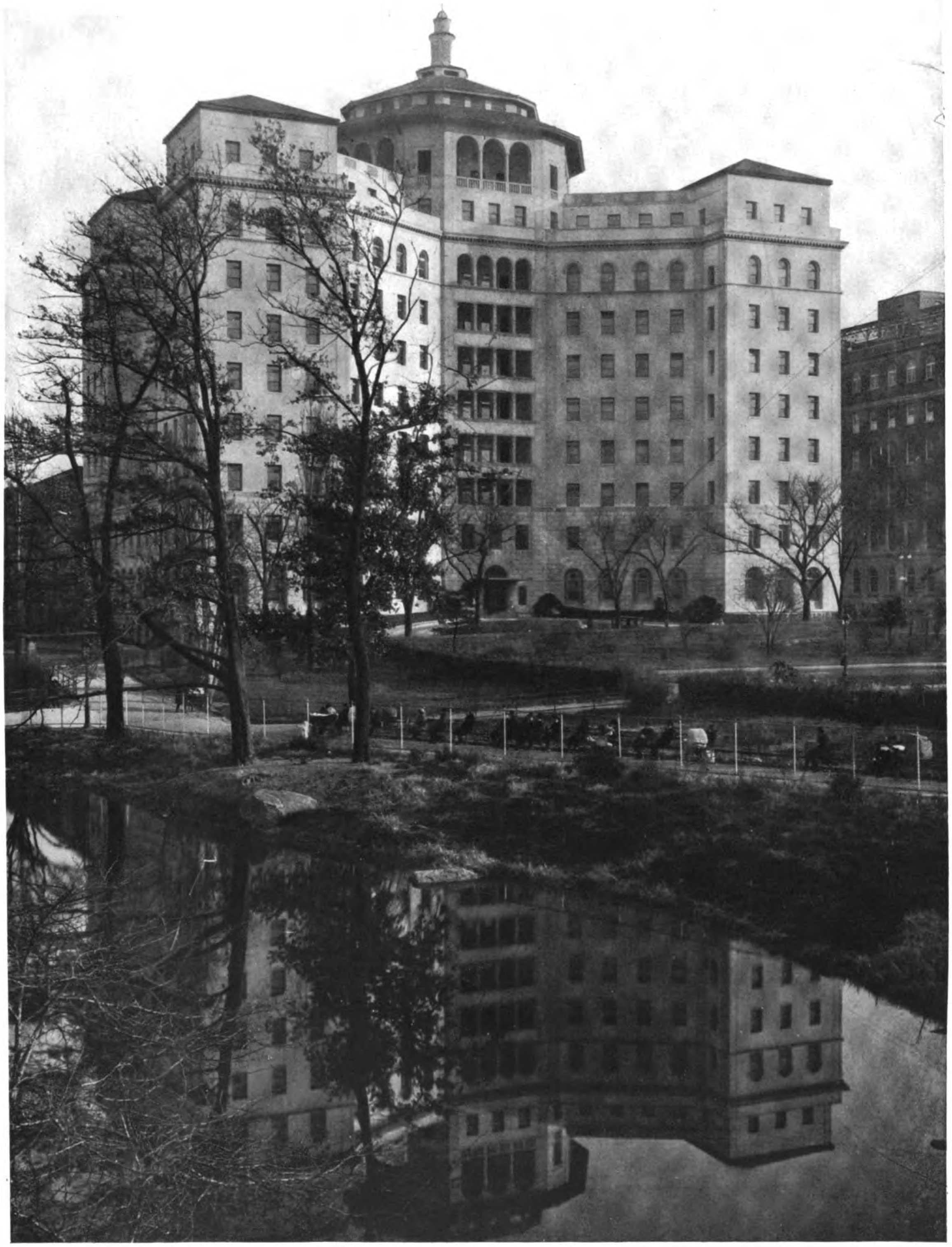
Hotel Atmosphere in Public Rooms. A proper mental attitude of the patient was hardly possible in the older forms of hospitals which resembled correctional institutions, and it cannot be questioned that patients will be more cheerful, looking forward to the success of operations with more certainty, and benefiting greatly if everything they see about a hospital is familiar and inviting, rather than calculated to arouse curiosity and possibly fear. Many discerning hospital administrators have not been slow to appreciate the desirability of making their institutions attractive to the eyes and minds of the patients, and have happily compromised between the most rigid simplicity and the details of hotel and house finish and decoration. It may cost a little more to clean a projecting architrave and panel work than it does the institutional flush casings of doorways, or to use flat paints than it does glossy enamel, but the results in the quick recovery of patients seem to be worth the additional expense.

The entrance, reception rooms, parlors and porches for convalescing patients, for receiving their relatives and friends, should be furnished with as much care as is used in the best hotels and residences. In very large hospitals, parlors for the reception of friends and relatives should be convenient of access to every convalescent, and the cost of replacing the more delicate furniture required for the kind of furnishings mentioned should be considered a necessary expense.

Better Provisions for Nurses and Staff. The very low ratio of non-employment in this country in the past three or four years has made it increasingly difficult to attract women to the profession of nursing. Due to this, and also because it is only common justice, it is desirable to provide proper and adequate accommodations for the nurses, internes, orderlies and other employes of the hospital. Many hospitals are built with little thought of the number of nurses which will be required or the accommodation they should have, and when the hospital is built and completed there is generally not sufficient money available to build a proper nurses' home, and they are lodged in rented quarters, obviously unsuitable, and fed in unattractive, cramped basement dining rooms. Manifestly every estimate of the cost of a hospital should include the cost of a proper building for the nurses, with social, reception and dining rooms, sewing room and laundry where they can do a little of that kind of work when necessary, also a sitting room in connection with each group of sleeping rooms where the nurses can relax before retiring.

It seems to be the consensus of opinion among superintendents of nurses that single-bed rooms are more desirable than two-bed rooms, though possibly some nurses may suffer less from nostalgia during their freshman years if they have roommates. If the hospital can afford them a gymnasium and swimming pool will be appreciated accommodations, and if a training school is combined with the hospital, the teaching rooms, laboratories, diet kitchen and demonstration rooms are better located in the nurses' home than in the hospital proper. The home should be sufficiently removed from the hospital to permit the nurses to relax when off duty, and to enjoy themselves in natural and reasonable pleasures without disturbing the patients in the hospital. The accommodations should be made as nearly as possible like those of a good American home.

The quarters of the superintendent, internes, orderlies and help should be arranged with all reasonable provisions for the comfort of their occupants. Locker and consultation rooms should be

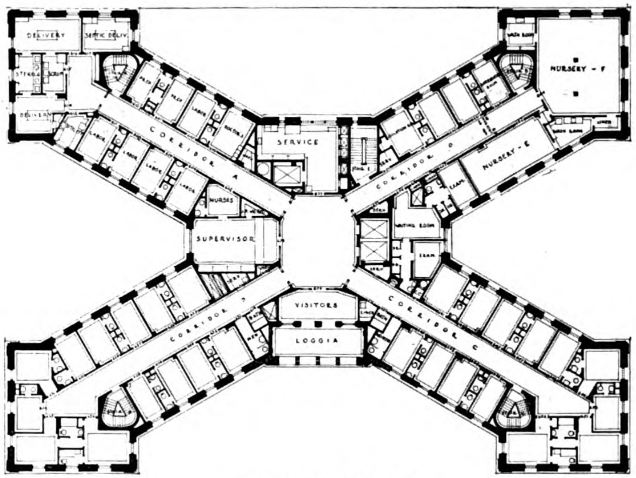


GENERAL VIEW FROM CENTRAL PARK

FIFTH AVENUE HOSPITAL, NEW YORK

YORK & SAWYER, ARCHITECTS

WILEY E. WOODBURY, M.D., CONSULTANT



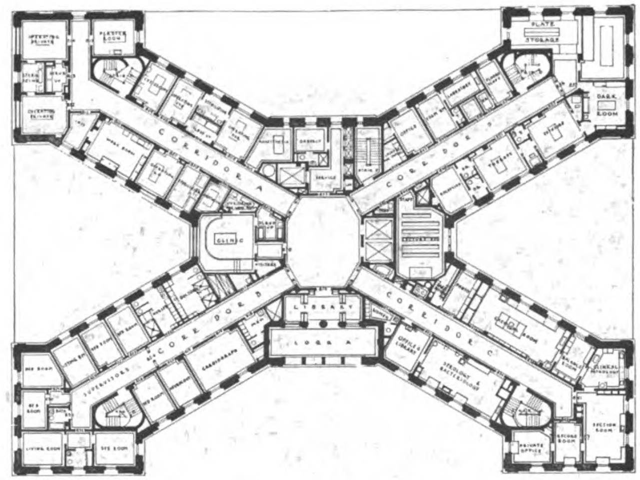
SIXTH FLOOR PLAN

FIFTH AVENUE HOSPITAL
NEW YORK

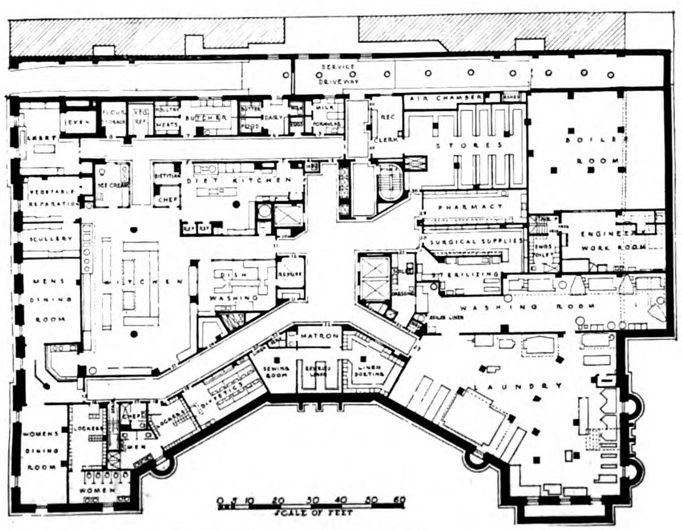
Illustrations on Plates 89 and 90

Type of construction. Fireproof
Exterior walls. Brick, stuccoed, limestone, terra cotta
Roofs. Tile
Floors. Terrazzo, tile, rubber
Heating. Steam, chiefly direct radiation
Ventilation. Exhaust in certain rooms; minimum forced fresh air supply
Windows. Wood, double-hung, transom sash
Area of building. Plot 200 x 150
Date of general contract. 1921
Cost of building proper. $3,000,000
Number of beds. 420

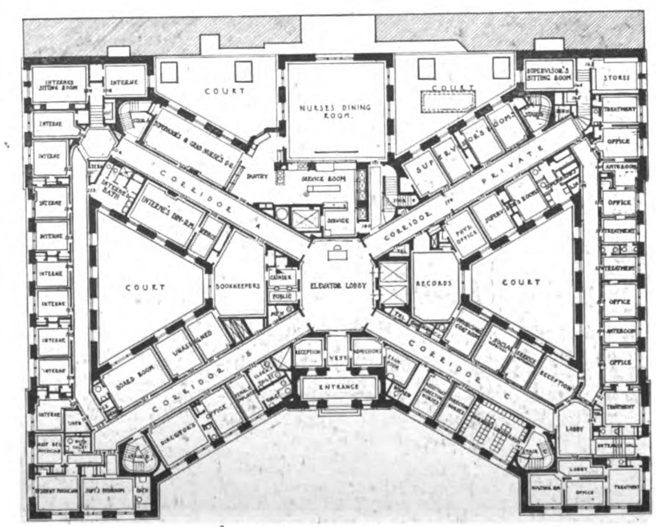
This building is entirely devoted to private rooms and is characterized by centralized service. Nurses' bedrooms, with demonstration and recreation rooms, are on the ninth floor. Boiler room, machinery room and morgue are in the sub-basement.



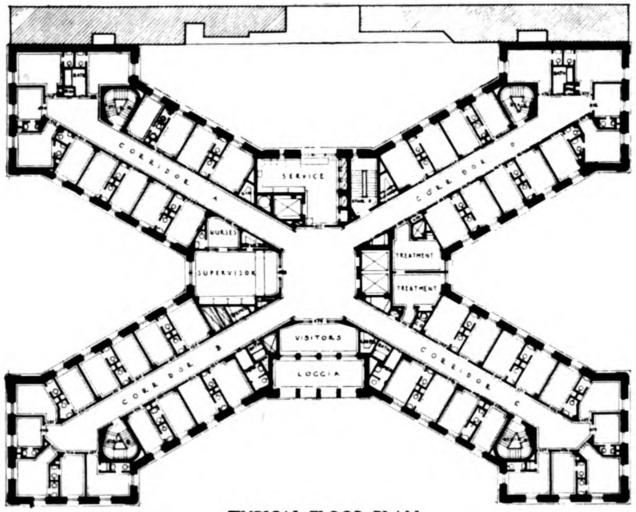
EIGHTH FLOOR PLAN



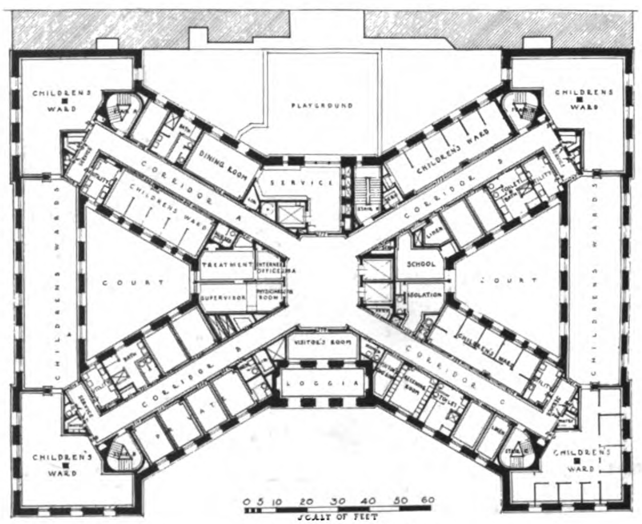
BASEMENT FLOOR PLAN



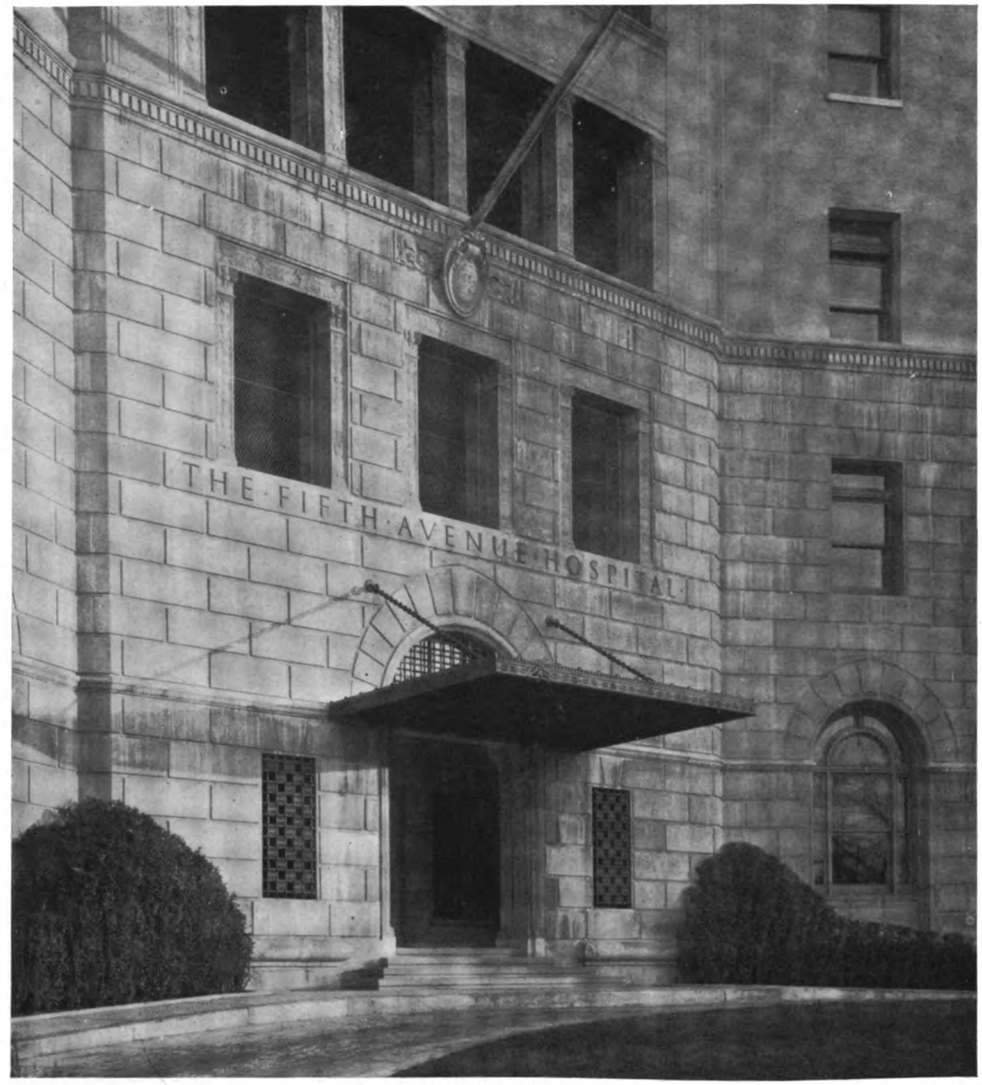
FIRST FLOOR PLAN



TYPICAL FLOOR PLAN



SECOND FLOOR PLAN



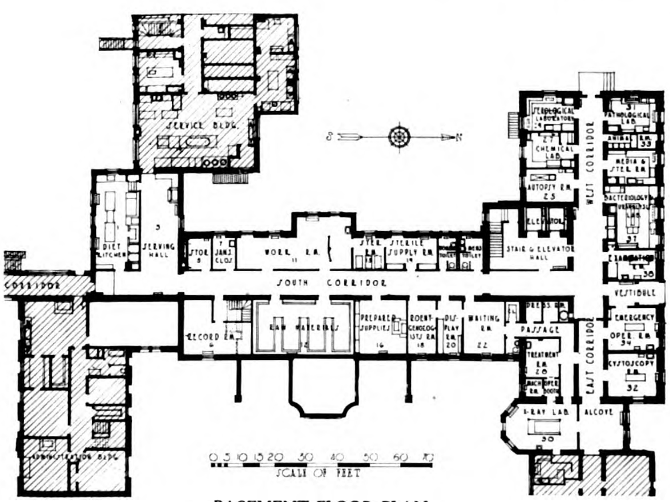
DETAIL OF ENTRANCE

FIFTH AVENUE HOSPITAL, NEW YORK

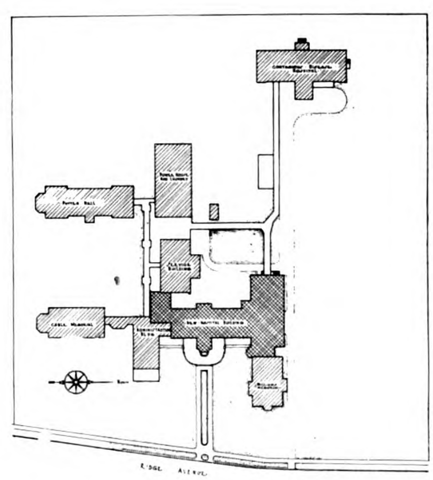
YORK & SAWYER, ARCHITECTS

WILEY E. WOODBURY, M.D, CONSULTANT

GENERAL VIEW FROM FORECOURT



BASEMENT FLOOR PLAN



PLOT PLAN

ADDITION TO EVANSTON HOSPITAL, EVANSTON, ILL.

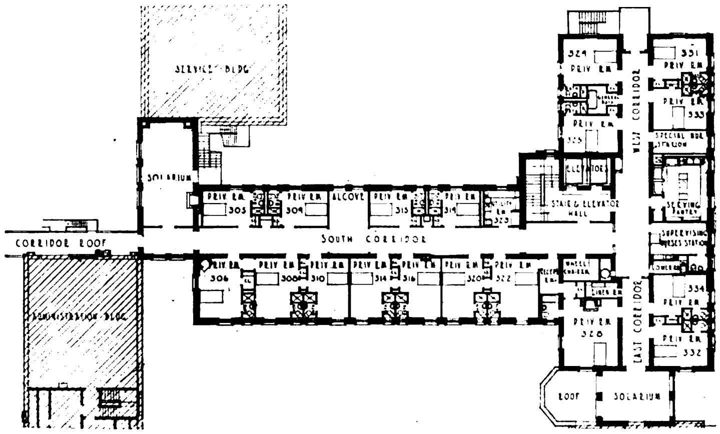
RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

ADDITION TO EVANSTON HOSPITAL
EVANSTON, ILL.

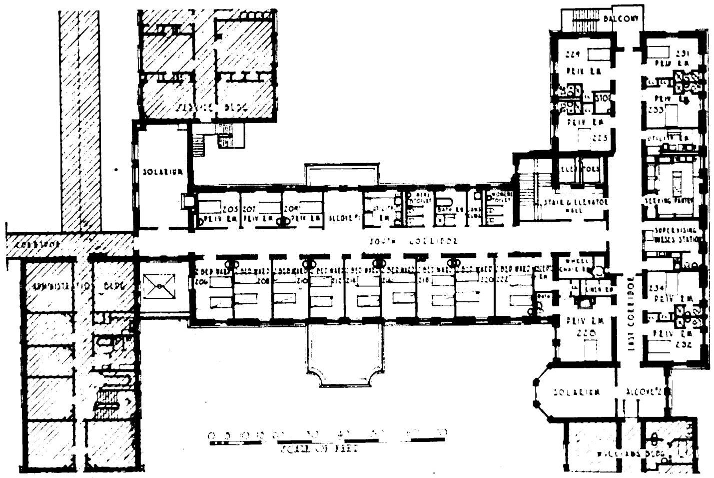
Illustrations on Plates 91 and 92

Type of construction. Fireproof
Exterior walls. Concrete, brick facing
Cubage of building. 935,081 cu. ft.
Date of general contract. June, 1919
Cost of building proper. $483,747
Cost per cu. ft. 51¾¢
Number of beds. 80
Cubic ft. per patient. 11,688

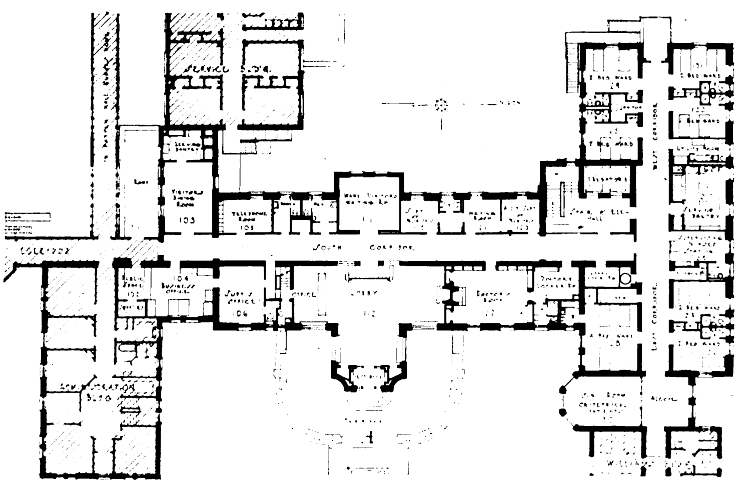
This building is largely devoted to private rooms and includes executive departments, operating rooms, laboratories, X-ray, cardiograph and autopsy departments sufficient for a 350-bed hospital. Kitchen, laundry and power plant provided in other buildings.



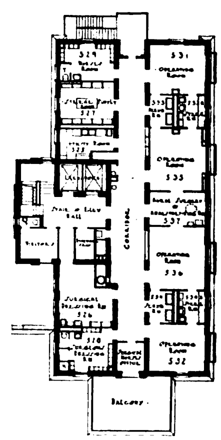
THIRD AND FOURTH FLOOR PLANS



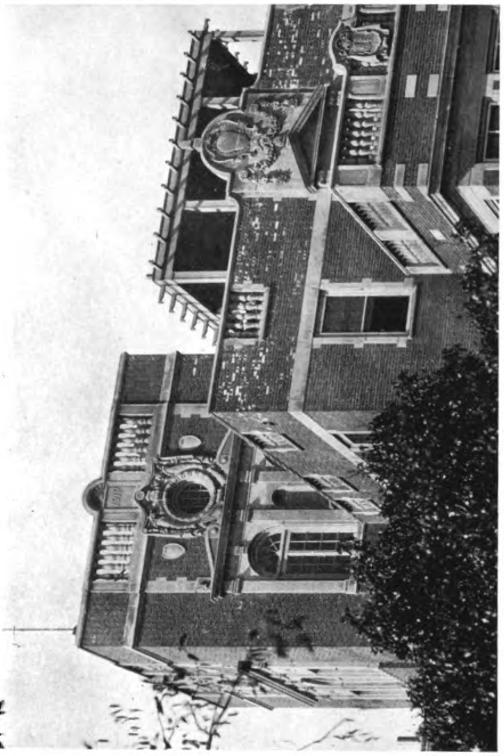
SECOND FLOOR PLAN



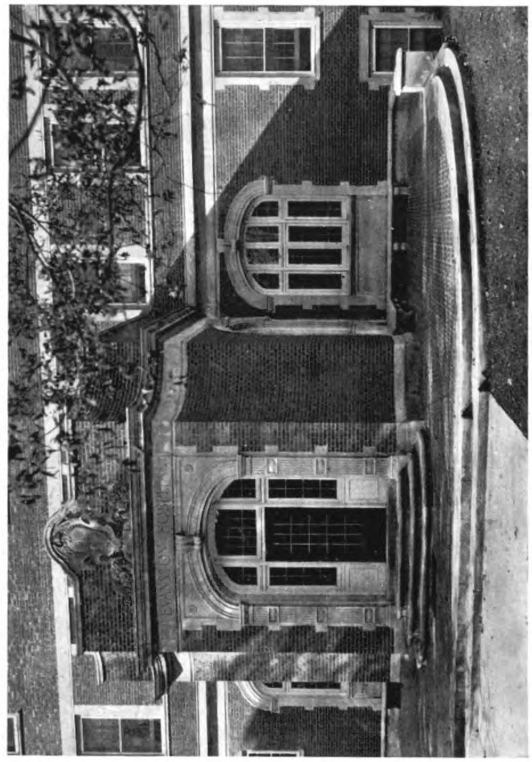
FIRST FLOOR PLAN



FIFTH FLOOR PLAN



DETAIL OF UPPER STORIES



DETAIL OF ENTRANCE

OPERATING ROOM SIDE

ADDITION TO EVANSTON HOSPITAL, EVANSTON, ILL.

RICHARD E. SCHMIDT, GARDEN & MARTIN, ARCHITECTS

PRIVATE PATIENTS' PAVILION, MOUNT SINAI HOSPITAL, NEW YORK

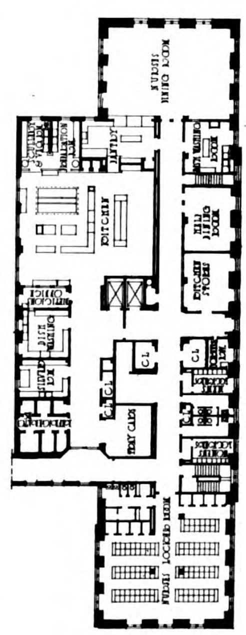
ARNOLD W. BRUNNER, ARCHITECT

S. S. GOLDWATER, M.D., CONSULTANT

OPERATING ROOM FLOOR PLAN

TYPICAL FLOOR PLAN

FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

MOUNT SINAI HOSPITAL
NEW YORK

Illustrations on Plate 93

Type of construction. Fireproof
Exterior walls. Brick, limestone and terra cotta
Floors. Marble, terrazzo and linoleum
Heating. Hot water
Windows. Wood, double-hung with transoms
Area of building. 10,421 sq. ft.
Number of beds. 131
Cost of operating per day per bed. $7.05

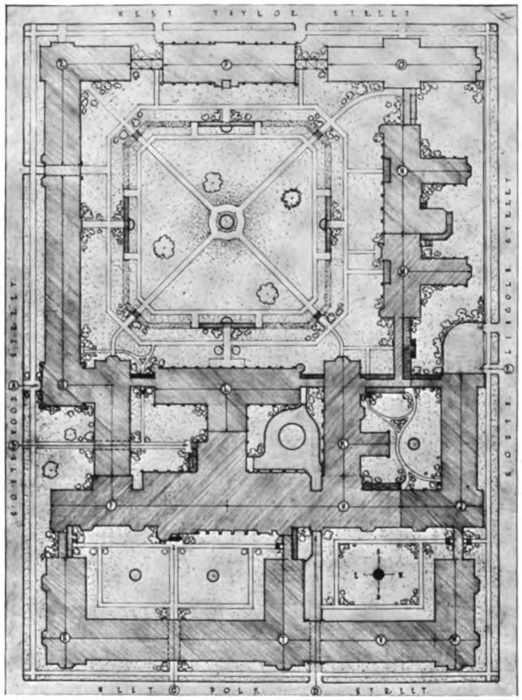
This construction includes kitchen. Laundry, boiler room, laboratories and other service provided in other buildings. Building devoted entirely to private rooms. A special feature is the introduction of balconies on the east leading from patients' rooms.

provided for the staff where they can confer, telephone, etc. In the maternity department there should be a room in which the attending obstetrician can sleep while waiting on a case or after a delivery in the late night or early morning hours.

Administration Quarters Enlarged. Notwithstanding that charity is of first importance in the conduct of a hospital, it cannot be dispensed without money, and every facility for receiving it in return for services must be provided, just as with successful business enterprises.

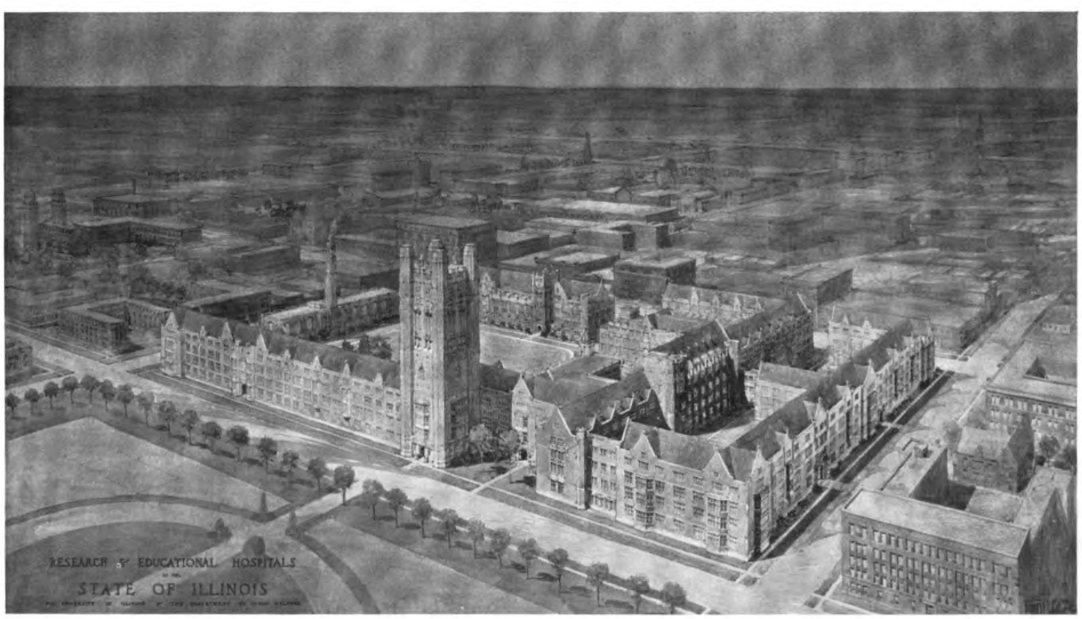
Not many years ago the business office of a large hospital consisted of merely the desk of the superintendent. He was manager, bookkeeper and cashier, but today the well ordered hospital has a public business office with an information desk similar to that of a hotel, semi-private desks for quoting rates, paying bills, for bookkeepers, accountants and typists, and private offices so arranged that admissions, charges, financial matters and all other business of the hospital can be carried on quietly without publicity or annoyance of any kind.

Maternity Quarters Increasing in Size and Equipment. Only in recent years has it been generally understood that a hospital affords many safeguards to the mother and child which cannot be furnished, or at least only with great difficulty in the home, and that the death rate is very much lower for hospital deliveries than for those taking place outside of these institutions. Consequently it is the custom today, among those who can afford to pay for the service, to go to the hospital for confinement, resulting in an increase in the number of births taking place in hospitals year by year. The probable increase should be



General Plot Plan
Research and Educational Hospitals of the State of Illinois, Chicago

A. Administration Entrance
B. Out-Patients' Entrance
C. Students' Entrance
D. Ambulance Entrance
E. Kitchen Entrance
F. Clinical Institute
G. Extension of Clinic
H. Ear and Eye Infirmary
J. Ear and Eye Extension
K. Psychiatric Institute
L. Administration
M. Orthopedic Institute
N. Orthopedic Extension
O. Infectious Diseases
P. Power Plant
R. Venereal Diseases
S. Research Institute
T. Library and Classes
V. Classes and Laboratories
W. Dental Infirmary



Perspective View of Completed Research and Educational Hospitals
Edgar Martin, Supervising Architect; Richard E. Schmidt, Garden & Martin, Associate Architects

taken into account in planning the maternity department, or the maternity hospital. The plan should permit of increasing the sizes of the various parts without destroying too much of the original value.

In addition to the usual accommodations, it is advisable to provide a nursery or room for isolating infants, and facilities for bathing the babies either in a separate room or in the nursery. The delivery and labor rooms should be separated from the wards and private rooms of patients, and special provisions should be made for soundproofing the separating floors, partitions and doors as much as is economically possible.

Out-patients' Departments. These departments have a twofold advantage: First, they provide medical service for the poor, some of whom would otherwise continue to suffer without seeking relief, their depreciated capacity becoming a burden to themselves, the community and an economic loss. The second reason is that the out-patient department provides clinical material for the physician and student, which increases the knowledge of the respective physicians and the sum of medical and surgical knowledge. It is more and more appreciated by physicians and supporters of hospitals that the hospital is logically a center for the study of medical sciences if it is to fully discharge its duties to the community. Consequently, provisions should be made in the plan of every hospital for incorporating a department of this kind. If not initially, ample space should at least be set aside for its installation in the future.

Hospital Roof Uses. Country and suburban hospitals, which are not more than two or three stories high and built on large grounds, do not require the use of the roof for patients.

Gardens on the roofs of city hospitals built in congested areas are a practical necessity which cannot very well be met by other arrangements. They should be built so that a patient can be sheltered by a wall or a roof or both, where he can be placed where he can benefit by unlimited sunshine and air. There are disadvantages in assembling patients from different floors and different departments on a roof,—transportation and supervision may be too much of a burden, and it is a better arrangement, if it is possible, to build the various stories with setbacks on ends of wings and to provide roof gardens adjacent to and level with the different wards or departments of the institution. It is sometimes possible to accomplish this by placing the largest department, possibly the surgical, on the lowest floor, and the others in the inverse order of their sizes in the succeeding stories. The roof gardens of a building arranged in that manner will be used, inasmuch as it will not be laborious to roll the patients out of the wards in their beds or wheel chairs, and yet they will remain under the observation of the nurses who can continue their duties to other patients.

Hospitals for Correctional Surgery and Preventive Medicine. The prevention of disease is now receiving greater attention than ever before. The many plagues which have spread over the world, recently influenza, have resulted in millions of deaths. The medical examining boards of the army and navy found that a large proportion of our young men had physical defects which could have been prevented or corrected if there had been periodical medical examinations. These reasons, and the knowledge that there is a growing appreciation of the fact that efficiency is largely a question of health, are leading higher schools to establish university hospitals for the study of preventive medicine and the correction of defects, for the study of the diseases of the eye, ear, nose, throat, causes of insanity, the surgical treatment of deformed and crippled children, the diseases of the blood, the heart, lung, stomach, intestines, kidney, bladder and innumerable other diseases and defects.

Universities have many leading scientists, chemists, pathologists and medical men on their faculties who can go far if they have the material to work with. They can also graduate much better classes and better doctors if they have patients to observe. The appreciation of these facts is leading to the establishment of such hospitals for the treatment of the unusual and exceptional cases and not for the treatment of many similar or routine cases. The various departments are not designed to accept a large number, but are limited to the unusual in order to permit the staff to study these and to acquaint the students with them and not send them into practice with only a foundation of book knowledge.

Tendency toward Consolidating Plants. The overhead cost of operating four or five hospitals, the total bed capacity of which is 500, is undoubtedly greater than that of one institution of 500 beds. Having four or five superintendents, engineers, switchboard operators and every other kind of officer or employe, instead of about half that number and in some cases, such as the superintendent, only one, is among the principal reasons for advocating the consolidation of small hospitals. It is obvious that a 100-bed hospital cannot have all of the departments which a 500-bed hospital can have. Some of them would be so small that the expense of equipping and operating would be prohibitive.

It may be possible to conduct a 250- or 300-bed hospital fully as economically per unit as it is for a hospital of any other capacity, and economy may be purely a personal element of management. Certainly it is uneconomical in cost and operation to completely equip several small hospitals with adequate laboratories, X-ray suites and other items of equipment and to man them with the personnel required to operate these things. In the large hospital there is so much work for the pathologist, Roentgenologist and other technicians that they are employed continuously, and every patient can have the advantage of all of the most approved examinations and treatments known to medical science.

Preliminary Survey for Hospital Design

By S. S. GOLDWATER, M.D.
Hospital Consultant and Director, Mount Sinai Hospital, New York

IN the most unreasonable manner possible (though without the slightest intention of being unreasonable) hospital boards are wont to call upon architects to design hospital buildings without first supplying the elements of a program. How can anybody plan an adequate hospital building without previously acquiring an exact knowledge of the needs of the institution, of its policies, and of all of the working methods which are peculiar to it?

What are the elements which enter into the preparation of a real hospital program? Consider, first of all, the question of capacity. Very often the figure originally given bears no real relation to actual needs. In another city or town a certain hospital has perhaps been seen and admired, and without further thought the conclusion has been reached that a hospital of that size is wanted. In other instances the starting point is a given sum of money; a rough estimate is then obtained of the "cost of construction per bed" (a most misleading term), and the size of the hospital to be built is thus determined. Common sense often demands that one cut one's garment according to the cloth, but in the planning of a hospital this is a poor rule, for even if the amount of money available is insufficient to build immediately the hospital that the community needs, an ideal program may be formulated in the hope that it will be realized step by step.

In determining the size of a hospital, the population to be served is the first element to be considered; numbers, character, and rate of growth call for separate attention. Relevant to this study are the economic resources of the community, the prevailing occupations and their health hazards, the manner in which families and individuals without families are housed, hospital facilities already available in the neighborhood, the sickness rate of the community, the presence of groups possessing special characteristics or customs (a racial group may be noted for its unusually large birth rate and for its employment of midwives instead of doctors), and religious beliefs insofar as such beliefs are likely to affect the attitude of the people toward the proposed sectarian or non-sectarian hospital.

To determine the total number of beds is, of course, only the first step. How should these beds be classified socially and clinically? What proportion of the total number of patients to be cared for are likely to be in a position to meet the cost of private rooms? How many will seek, or should be persuaded to accept, semi-private accommodations? For how many may "public" ward beds appropriately be provided? Is the community one in which the incomes of a considerable part of the population fluctuate, and should the hospital plan, therefore, be of so flexible a character that the line which separates the public from the semi-private wards, as well as that which separates the semi-private from the private room service, may be readily shifted? If the building program has to do with the expansion of an existing hospital, to what extent can the present buildings be adapted to the larger program?

Hard upon the heels of these questions follow others no less fundamental. What is the contemplated scheme of clinical organization? Besides the basic departments of medicine, surgery, obstetrics, and pediatrics (the present article is written from the standpoint of the planning of a general hospital), what clinical branches are to be recognized? In this connection, consideration must be given to the diseases of women, to diseases of the eye, ear, nose and throat, to venereal diseases, to urology, orthopedics, dermatology, neurology, and psychiatry. And always there remains the puzzling question of contagious diseases. In New York an ordinance requires the inclusion in any general hospital of certain minimum accommodations for the care of contagious cases, but the problem is an urgent one apart from any question of legal compulsion.

The immediate building program and the future expansion of the hospital should be separately considered. Clinical expansion may be anticipated in two directions: in the case of a hospital in which the various clinical specialties are at the outset either unrepresented or incompletely represented, the subsequent introduction of additional clinical departments may be taken for granted; while in the case of a hospital which is completely organized at the outset, the probable rate of growth of each of the different clinical divisions must be considered. Just now the demand for maternity beds is increasing throughout the country more rapidly than is the demand for hospital beds for any other purpose. Recent statistics show that 13 per cent of all of the children born in the United States are born in hospitals, but in a few communities the figure has risen to 40 per cent.

Before dismissing the subject of clinical organization, it is necessary to consider the handling of convalescents. Are separate convalescent wards desired, or is there to be an affiliation with a branch hospital for the treatment of convalescents? It matters a great deal whether the average stay of hospital patients is 12 days or 20; the shorter the stay the greater the treatment facilities required.

In planning a university or teaching hospital special needs are encountered. In such a hospital clinical lecture rooms of various kinds must be featured, and locker rooms, toilet accommodations, and perhaps lunch rooms for medical students provided.

The location, size, and equipment of the clinical record room depend in part on the proposed method

of administration. In some hospitals the clinical records of both in- and out-patient departments are assembled at a single center, but this procedure is by no means uniform.

Every ambitious hospital has, or hopes to have, a medical library. In hospitals of moderate size it seems desirable to locate this near the clinical record room, so that the same person or persons can supervise both library and clinical record room.

The number of operating rooms should be calculated with relation to the total number and kinds of surgical cases to be treated, and with due regard to the organization and working methods of the staff. In a staff or "closed" hospital the number of operating rooms required is relatively smaller than in an "open" hospital, where the convenience of a larger number of visiting surgeons enters into the case. Operating rooms in which artificial illumination only will be used should be differently planned from those in which natural lighting is preferred.

The architect needs guidance in planning operating room accessories. How large a dressing and locker room is desired for the visiting staff? Is each surgeon to have his own private locker? Is a separate dressing room required for the house staff? Are surgical dressings for the entire hospital to be sterilized on the operating floor, or elsewhere? Where are the surgical supplies to be prepared, and how much space will be required for the purpose? Will patients be anesthetized in anesthesia rooms or in the operating rooms? Is a recovery ward desired? Do the surgeons want top light, or will vertical north windows suffice? Are professional visitors in large numbers expected to be present at operations? Will portable observation stands for the visitors suffice, or are built-in galleries called for?

Before planning the laboratory it is desirable to get the fullest information possible from those who are to be in actual charge of the laboratory work. All of the laboratory work of a hospital of a moderate size may be done in a single large room, but in that case the equipment of the room will be most varied. Separate rooms are usually wanted for pathology, bacteriology, serology, and chemistry. The manner in which the house staff are to participate in the laboratory work of the hospital should be defined. The program may contemplate the routine examinations of specimens of blood, sputum, urine, gastric contents, etc., in a special clinical laboratory or laboratories set aside for the exclusive use of the resident staff, major laboratory determinations only being referred to the central laboratory. Where the highest scientific standards are sought, laboratory facilities of a modest kind may be demanded in connection with each ward.

The hospital should be called upon to define its policy in relation to scientific research. If laboratory investigations are to be intensively prosecuted, rooms and equipment must be provided for this work, apart from the laboratory equipment which is intended for the routine work of the hospital. Quarters for test animals are essential, and for a research laboratory an animal operating room is indispensable.

Certain auxiliary diagnostic and therapeutic services may next be mentioned. First and most important among these is the department of radiology, embracing radiography, fluoroscopy, and radiotherapy; this is a department which calls for the most careful study, in which the radiologist (and perhaps the firms which are to supply the equipment) should take part. Other divisions are the division of electrocardiography; the respiration laboratory; the department of bio-physics (radium treatment); physiotherapy, including hydrotherapy, thermotherapy, and mechanotherapy. Occupational therapy is related to both physiotherapy and psychotherapy. The dental department might be mentioned as a special clinical branch, although in most hospitals the work of the dentist is regarded as subordinate to that of the regular clinicians; in any event, the extent and character of the projected service requires definition. The accurate recording of certain clinical phenomena demands the use of photography, and photographic ateliers are found in a constantly increasing number of hospitals.

Receiving or observation wards, which are difficult to classify clinically, owing to the miscellaneous character of the service which is demanded of them, nevertheless facilitate greatly the proper classification and handling of newly admitted cases. What shall be their capacity? To answer this question intelligently, the hospital's methods must be known.

Emergency treatment room or rooms and the ambulance entrance should be close to the receiving wards. Is the neighborhood one in which accidents are many or few? Will a single emergency treatment room suffice?

Balconies, roof wards, and solaria comprise an important group of facilities from the standpoint of effective medical care and health, and naturally the building committee must decide upon their number and capacity.

The plan of the out-patient department may be a liberal one, including separate accommodations for the departments of medicine, pediatrics, obstetrics, neurology, mental hygiene, dermatology and syphilis, surgery, diseases of the eye, ear, nose and throat, gynecology, orthopedics, genito-urinary diseases, proctology, gastrology, dentistry, infant hygiene, and adult hygiene. If a comprehensive organization of the out-patient department is desired, all or nearly all of these departments must be represented, but only in the largest hospitals is any attempt made to admit patients to all of the enumerated departments simultaneously. A more modest program may be chosen,—one which requires that groups of departments utilize the same rooms at different hours. In estimating out-patient capacity, the architect should remember that the capacity of a department may be doubled by holding two daily sessions instead of one. The utilization of an out-patient department for teaching purposes affects markedly the character of the plan, and the purpose of the

hospital in this respect should be made known. Other questions which have relation to out-patient planning are, that of the central or common record room *versus* individual departmental record keeping; the manner in which the drug department is to be conducted; the manner in which patients are received and their "histories" taken; the utilization of the out-patient department as a clinic for paying patients or as a follow-up station in connection with the hospital's ward service; the conduct of the social service department.

For the planning of the administrative or business center of the hospital, certain information is requisite:—the number and functions of the executive officers; the method of receiving, registering, and admitting patients (all patients may be received at a single entrance, or a separate entrance may be provided for private patients); the character of the social service organization and its office requirements; the number and duties of officials connected with the training school for nurses; the number and duties of heads of other administrative departments, for whom offices are required; the number of employes in the accounting department. The telephone system calls for careful consideration (telephone "central," booths for public use, interior and exterior telephone service for officers, staff, employes, etc.).

Inquiry should be made concerning the needs of the medical staff, especially as to a meeting or clinical conference room, registration room, lounging and locker room, and consulting offices.

The major topics in connection with the planning of the nurses' home are these: total capacity, teaching facilities (classrooms, laboratories, demonstration rooms), students' bedrooms, quarters for night nurses, special suites for officers, social rooms, quarters for attendants or nurses' aids, sleeping porches, nurses' infirmary, gymnasium, tennis courts, swimming pool, servants' quarters, kitchen and dining room service.

Dormitories and living rooms apart from the nurses' home are those for the superintendent or director of the hospital (frequently the superintendent has a cottage of his own, on or off the hospital grounds), for the superintendent's executive assistant or assistants, and for the resident medical staff. Local custom and local circumstances will determine how large a percentage of the domestic and other miscellaneous workers should be lodged on the hospital premises.

No attempt should be made to plan a hospital kitchen without previously determining the character of the food service. It is essential to know not only the number of persons to be fed, but whether food is to be sent to the wards in bulk or on individual trays; whether trays are to be prepared in the main kitchen or in the wards; whether there is to be a special diet kitchen for "feeding" cases; whether nurses are to be taught in the main kitchen or the diet kitchen. The capacity of the dining rooms for various classes of the hospital inmates must be studied, and the question of waitress service *versus* self-service (cafeteria) settled.

The laundry should, of course, be planned with relation to the volume and kind of work to be done. In this connection, the experience of hospital laundries under actual operation should be sought. The architect should know whether the hospital proposes to reclaim used surgical dressing gauze; how much space is wanted for sewing and mending, for the storage of linens, for sorting and distributing laundered goods.

Whether the clothing of ward patients is to be cared for in rooms adjoining the wards or in a central clothes room for patients is a matter of hospital policy; and, indeed, it is for the hospital to determine the exact nature of all the miscellaneous fixed equipment required for nursing or other purposes in connection with each ward unit, always remembering that all wards are not alike in their requirements.

Will the hospital produce its own light and power? What fuel is to be used—coal or oil? How accessible are reliable sources of supply? What should be the extent of the storage facilities? For each hospital and for each part of the hospital the problem of ventilation should be separately worked out, but an agreement should first be reached on fundamental principles of air supply and treatment. The number of elevators is a question for the architect rather than for the building committee to determine; but without investigating, the architect will hardly know whether visitors are likely to be few or many, whether the visiting staff will be large or small, whether patients in bed or in wheel chairs will be sent to the roof.

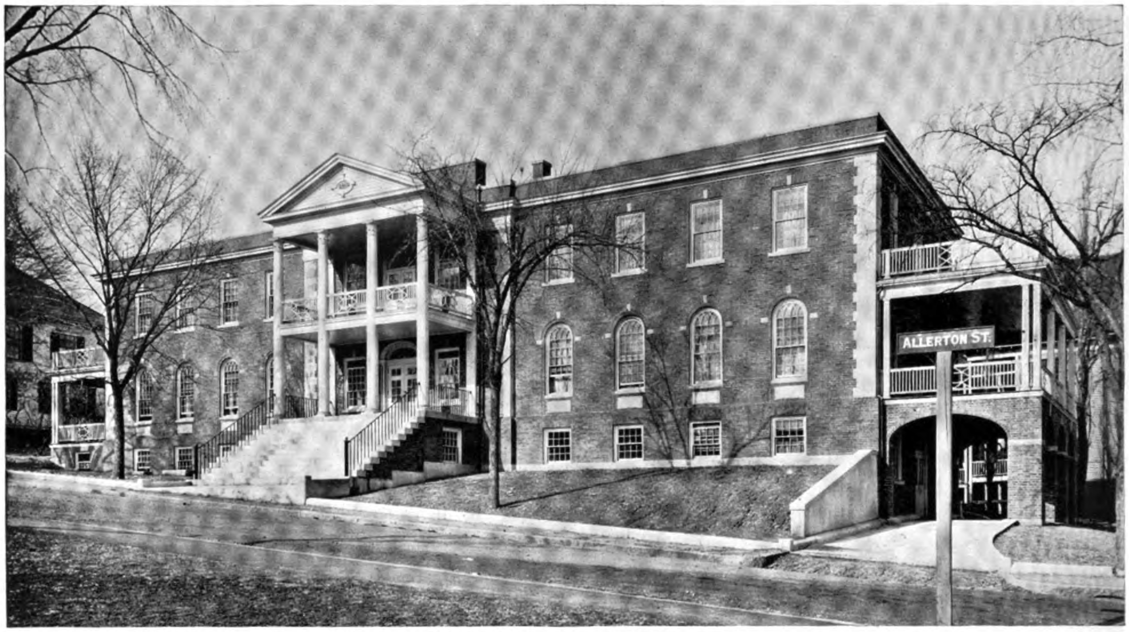
Shall the heating system be hot water or steam? Is the city water supply ample or must it be supplemented? Is a filtration plant necessary? Is a sewage disposal plant required? What are the legal and what the practical requirements in the matter of fire stairs, fire escapes, fire apparatus, and signal systems? Is the garbage to be carted away or to be incinerated on the premises? Are surgical dressings to be incinerated in a central destructor, or in small incinerators distributed throughout the hospital?

In due order the hospital authorities should express their preferences concerning apparatus for sterilization, refrigeration, and vacuum cleaning; concerning the illumination of wards, operating rooms, and laboratories; in relation to time clock systems, the care of mattresses, the location and arrangement of storerooms and trunk rooms, the number, kind, size, and locations of work and repair shops, the width of corridors, the use of clothes chutes, the location of the morgue and autopsy room, and the need of a mortuary chapel.

If the foregoing notes are taken as a guide, the skeleton, at least, of a practical hospital building program can be prepared. On all of the questions mentioned, and more, the architect is entitled to complete data, if he is expected to plan a hospital building that will adequately meet the needs.

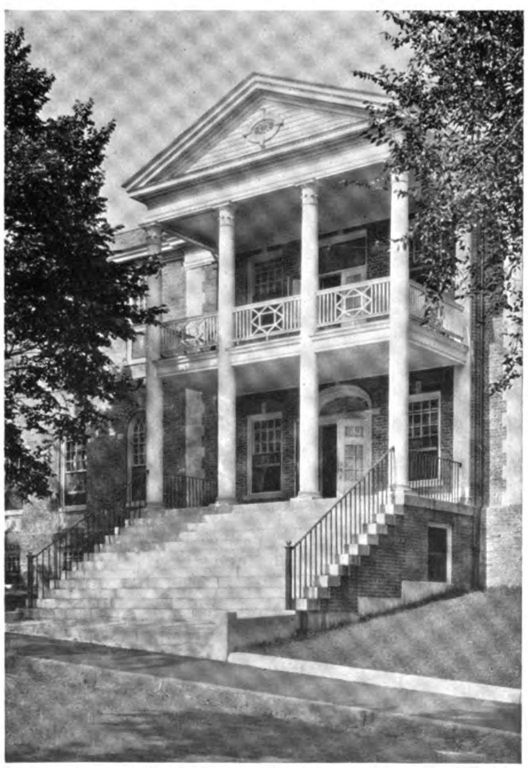
Trumbull (Private) Hospital, Brookline, Mass.

HAROLD FIELD KELLOGG, ARCHITECT

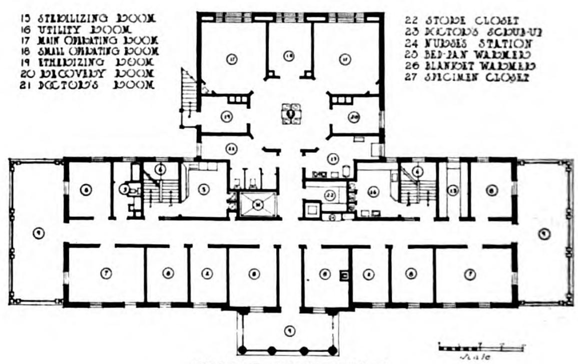


GENERAL EXTERIOR VIEW

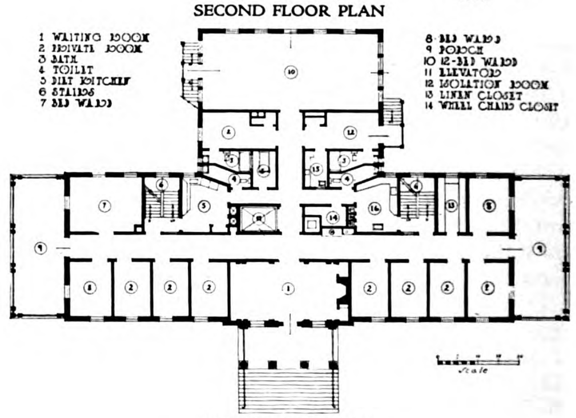
Second Class Construction. Date of Contract, Jan. 1921. Cubage 194,600 ft., Area 5560 sq.ft., Cost $144,988, Cost per cu. ft. 74½ c. 52 Beds. Cubage per Patient 3840. Steam Heat, Gravity Ventilation. Complete Individual Building



DETAIL OF PORTICO



SECOND FLOOR PLAN



FIRST FLOOR PLAN

The Selection and Development of Hospital Sites

By KENDALL, TAYLOR & COMPANY, *Architects, Boston*

IT is important that those who are to decide upon the location and site of a new hospital shall approach their problem without prejudice, for there are many conditions which will tend to warp their judgment and lead them to a decision on grounds of expediency or fancied economy which will in the end prove unsound and possibly prevent future growth and necessary expansion. Gift horses should be looked at in the mouth, to be sure they are sound.

The selection of a site is frequently made months, often years, before the architect is called into consultation, and seldom excepting in the case of "specialists" does the architect have a voice in this all-important matter. From the point of view of the trustees this may not be an important matter, but use of many ill-advised sites, taking the country over, makes one wonder if such advice—usually cheerfully given gratis—might not have had some weight in the selection of better locations.

The architect's problem, therefore, is either with his medical advisers or building committee, or with whichever group his direct contact comes, to analyze and study the conditions as he finds them. If, as is frequently the case in a suburban or country location, the lot is of several acres, an ingenious architect, with the aid of the many published articles on this subject, should not go far wrong in the proper orientation of whatever building or buildings are to go on the lot.

The type and character of the institution has to be considered—whether general, children's, orthopedic, maternity, contagious, mental, tubercular, etc. The first named can be, and often are, nearer or within the more settled districts, and opinions may vary as to the advisability thereof; the three last named should be more remote, for the good of the patient, if for no other reason, and all classes of hospitals for children should be so situated that the maximum of pure sunshine and clear air will be available. This holds for adults as well.

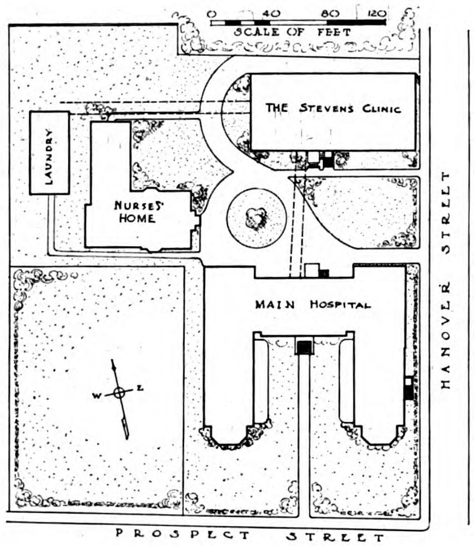
Physicians practice in the busy centers of life; their time and strength are limited, and the range of their activities is controlled by physical conditions which must be regarded. It is true that the motor car and ambulance have greatly widened the areas within which the practitioner of medical and surgical aid can act, but they are often called to more than one hospital and must be able to reach patients with the least possible expenditure of time and energy. Therefore, in the choice of a site one must consider not only the location ideal from the point of view of the patient, but its accessibility for patient, doctor, nurse and service. The resultant of these forces will usually be somewhat of a compromise for all the factors in the case.

There will always be the physical surroundings to be considered,—whether the trolley or steam cars pass near enough to annoy, in city locations, and today the possibilities of the proximity of a large garage or, as in an instance known, a paint factory on one side and a silver reclamation plant on the other. In country or suburban sites, a choice collection of gravestones may be in view, or a farmyard that distills odors which will drift in at the windows or across the lawns. A site in a district now nearly residential may be chosen, and in less than a generation the character of the community may have so completely changed as almost to warrant the abandonment of the plant. On the other hand, barring the possible gravestones, the chances are that the suburban site will improve rather than deteriorate, and the country site is always susceptible of improvement by purchase of adjoining properties at a modicum of expenditure. There are few city instances where this can be done. All of this indicates the wisdom of securing either an ample area in the beginning, or a location where future expansion can be secured without prohibitive costs. An ample area almost of necessity indicates avoidance of closely built areas and means a location either suburban or in the actual country.

Suburban sites give opportunity for acquisition of areas providing space for expansion and for the control of the immediate surroundings to an extent sufficient to eliminate noise, dust and other nuisances. The country affords these in still greater measure, and were these alone the controlling factors, it would inevitably dictate the choice; but the hospital not only houses the patient, it also gives the physician his opportunity to care for him, and it ought to make it possible for friends and relatives of the patient to visit him and, in case of emergency, gain prompt and easy access to him. The desire for open spaces and ample ground must, therefore, be tempered by these necessities.

The orientation of a hospital building or group is an interesting study from the theoretical and the practical sides. Physicians and scientists are well satisfied that the healing effect of the sun's rays and open air is beyond question. To almost every patient it is desirable to bring these helpful agents in as full a measure as possible, and in the ideal hospital every room would have a full sun bath all day long. Unfortunately this is not possible, but it is possible to so locate the building that under certain conditions and at certain seasons every side shall have the sun for a portion of the day. When the building goes beyond the simplest rectangle in plan, with an east and west axis, this means a distinct study.

The careful studies by William Atkinson, published in *The Brickbuilder* in July, 1903, and reprinted in *Organization and Management of Hospitals* (Cleveland Press, 1907), which are quite generally accepted as standards for this subject, show



Plot Plan, Union Hospital, Fall River, Mass.
Kendall, Taylor & Co., Architects

the approximate duration of the periods of light and shadow for different seasons. The best results in our northern sections are secured by rooms facing the south, and average results by rooms facing, in general, southwest or southeast. In a large building there will be inevitably some rooms where there will be no direct sunlight at any time, and the skillful architect will so plan his building that these rooms will be used for purposes where the direct rays of the sun are not vitally necessary, or for temporary occupation only. City locations cannot always be controlled, despite the best of advice, but here again the designer must, and of course will, keep the fundamental requirements in mind and will consider the disadvantages occurring from neighboring buildings that cast their shadows behind or before them.

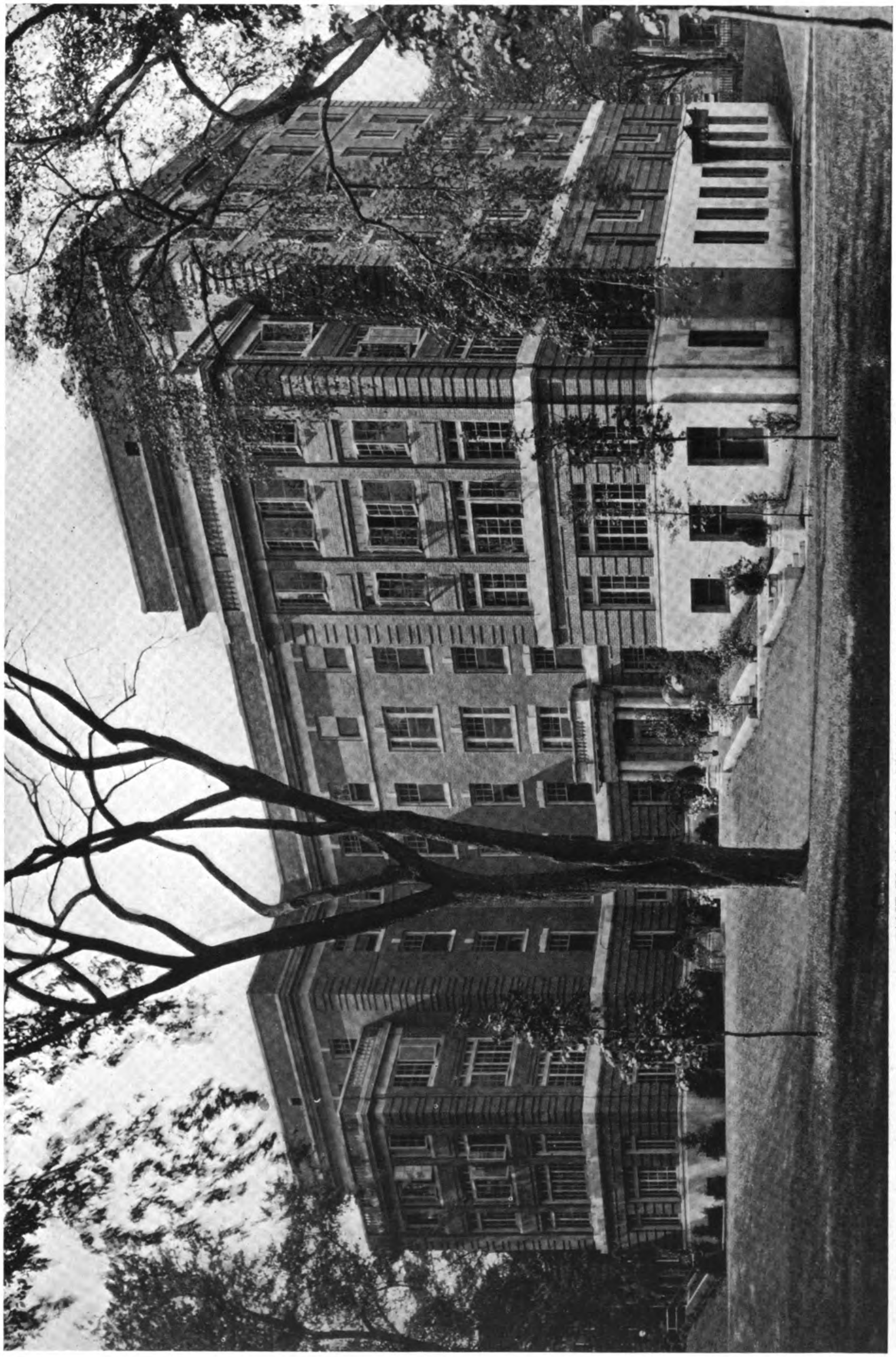
The site having been determined upon, a study of the comparative advantages of the various types of hospital should be carefully considered; zoning laws and other legal restrictions require consideration.

Economy in construction and maintenance have demonstrated the advantages of the multi-story building, and one of the very latest and best of these is the Fifth Avenue Hospital in New York. Another and much smaller type is the "Stevens Clinic" connected with the Union Hospital, Fall River, Mass. In this latter case the first and comparatively new buildings of the original group had become not obsolete but simply outgrown; the lot was far too small for development, and when it came to expansion it was either up, west or north. The first two methods were deemed inexpedient for certain reasons, but purchase of a small amount of land to the north enabled the development of the addition, but necessitated an involved study of the shade angles, for the new building had to have an east and west axis, quite desirable to be sure, but to the south and within a short distance were the original buildings. This, coupled with the all desirable and required balconies, finally evolved the setting back of each story, doing away with the heavy shadows of ordinary balcony construction. There is nothing new in the principle, but in hospital work it has not been done to any great extent. (Continued on page 261)

Exterior View of End

Detail of Airing Balcony

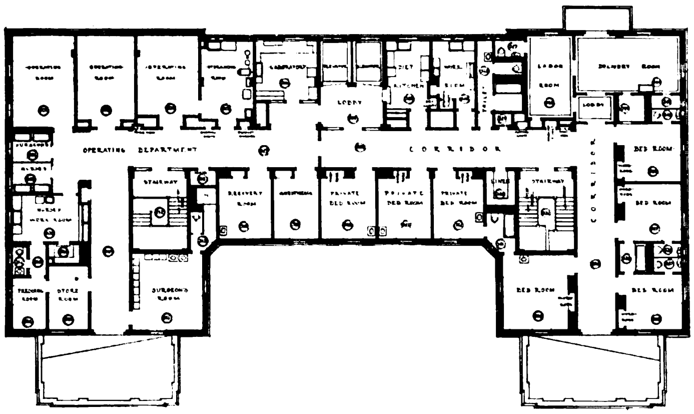
Stevens Clinic, Union Hospital, Fall River, Mass.
Kendall, Taylor & Co., Architects



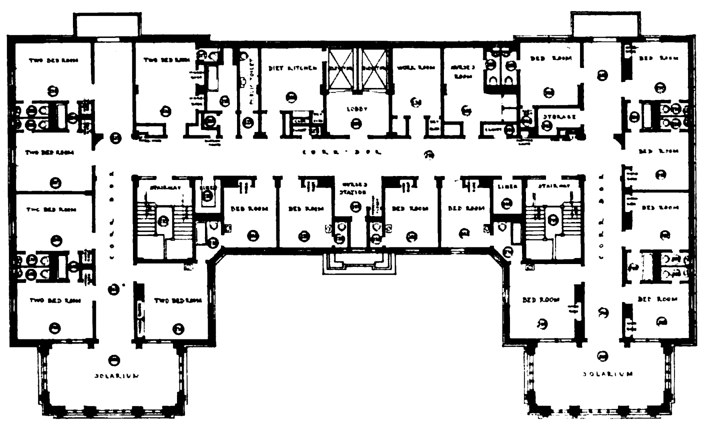
JANE FRANCES BROWN BUILDING FOR PRIVATE PATIENTS,
RHODE ISLAND HOSPITAL, PROVIDENCE
KENDALL, TAYLOR & CO., ARCHITECTS

JANE FRANCES BROWN BUILDING
RHODE ISLAND HOSPITAL
PROVIDENCE

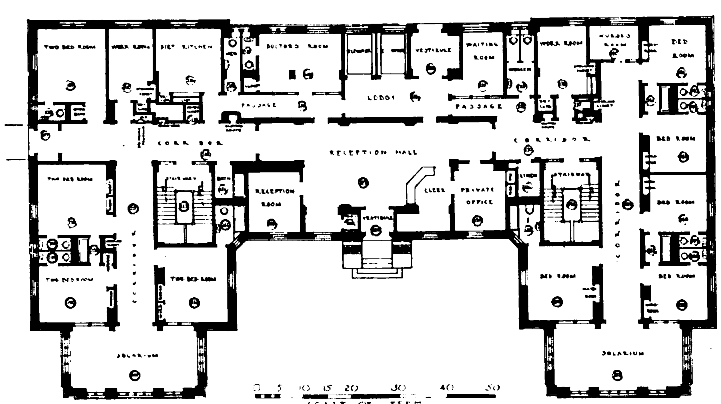
Illustration on Plate 94



FIFTH FLOOR PLAN



SECOND AND THIRD FLOOR PLANS



FIRST FLOOR PLAN

Type of construction. Fireproof
Exterior walls. Brick
Windows. Wood, double-hung
Area of building. 8,660
Cubage of building. 600,000 cu. ft. without connecting tunnel
Construction completed. 1922
Cost of building including certain fixed equipment. About $750,000
Number of beds. 86
Cubic ft. per patient. 6,976
Cost of operating general institution per day per bed. $3.78

This building is devoted entirely to private patients. Kitchen, linen storage and ambulance receiving room provided in the basement. Fourth floor similar to second except for nursery occupying space of two rooms and corridor at rear of right wing. Laundry and power plant in separate building.

The Brown Memorial Building of the Rhode Island Hospital, Providence, is a unit of a large city hospital for people who are fully able to pay for their care. The conditions surrounding the location of such a building are not in any way different from any other type of building. In this particular instance all of the disadvantages of a busy city location had to be carefully weighed. Fortunately, the trustees of this hospital from the outset 60 years ago have been men of keen vision, and sufficient land for building, protection and even a delightful view was available.

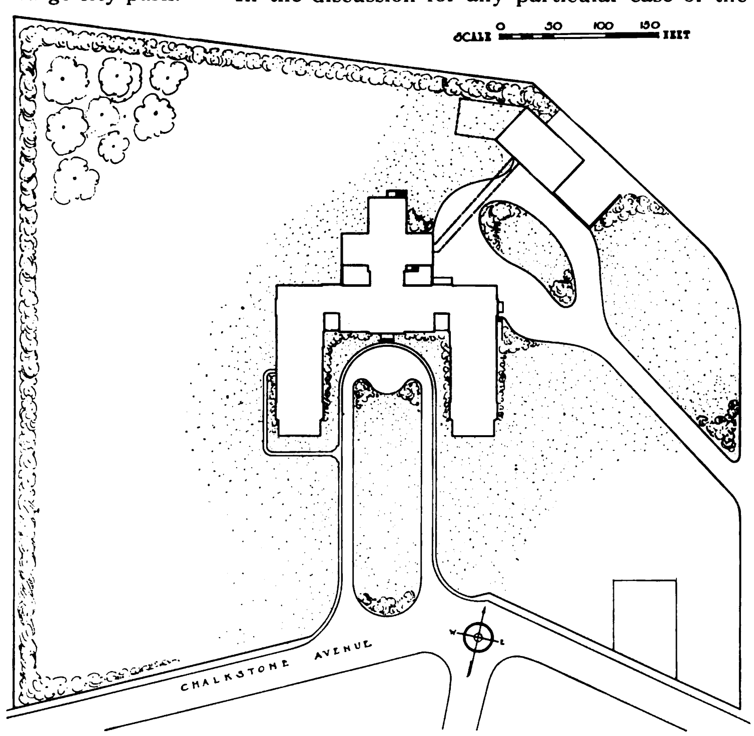
Another interesting illustration is of the 250-bed Homeopathic Hospital, also at Providence, construction of which has been but recently started. The site for this group of buildings is practically suburban, almost country, yet geographically it is not so and is in fact but ten minutes from the business district by trolley cars which operate on the main street adjoining. No trouble will be experienced from fuel, oil gases or soot from factory chimneys, for the prevailing winds will carry them far to the south. The site is to the northwest of the city center. The lot, containing several acres, will permit of more than doubling the bed capacity of the hospital, if ever required, by building to the east or to the west. To the north, across a wide parkway, are large properties, one a convent and the other a site for another hospital, making for permanency in surroundings in that direction, and to cap the climax, to the south and across the principal thoroughfare is a beautiful old estate, now a large city park.

This hospital will care for all cases usually admitted in a general hospital, with particular attention to people of varying means, and special attention will be given to obstetrical and orthopedic work. Too frequently these latter branches are treated apart in special institutions, handicapping and limiting the hospital activities and the training of the nurse. Again, up to comparatively recent times a general hospital has been too frequently for but one class of people,—charity or semi-charity,—and sad to say, for some who abused the privilege. Now, not only in this group, but in many others, every pocketbook can be suited. There will be some wards in the East wing, but none of over four beds. It was not deemed practicable to give each patient a separate room, but each patient in such wards can be in a separate cubicle if he so wishes.

The Leominster Hospital is a hospital to serve a community of about 20,000 people (at the present time) and is a country hospital insofar as its location is concerned. The lot was given by an individual who was wise enough to obtain the best advice possible (the architects were not consulted in the case, but had they been, would have approved the lot) and is sufficiently large not only for future growth, but to permit of a choice of several locations for the buildings. The particular merits of this plan are obvious to the initiated, so far as orientation and ease in care of patients are concerned, but it is only fair to say that it is not quite so economical in first cost as a plain, rectangular building housing the same number of patients. These examples are taken at random from recent work, in the belief that, briefly explained, they will be of interest and value.

It has not been thought necessary to consider the low pavilion type of building so common abroad, at Vienna and other places, in which a large number of buildings of one or more stories are spread over an immense area, requiring a vast original outlay and continued maintenance expense and expenditure of physical and other forces. The pavilion system has been used to an extent in this country, but economy has demonstrated the advantages of multiplying stories and installing elevators with a consequent reduction in the ratio of the cost per patient. Many of those built 20 years ago as one-story cottage hospitals have long since had the roofs raised and other stories built thereunder, to the happiness of all concerned.

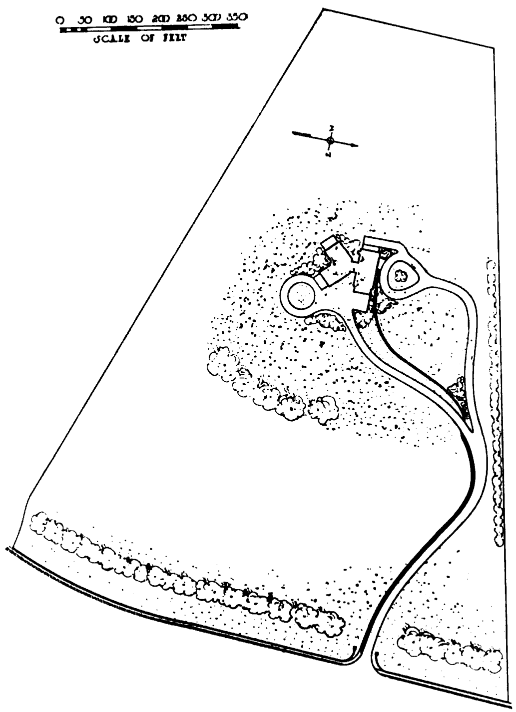
In the discussion for any particular case of the



Plot Plan, Homeopathic Hospital, Providence
Kendall, Taylor & Co., Architects

advantages of open or pavilion hospitals *versus* centralized or many-storied, the opinion of the trained medical and nursing authorities, whose active lives center in these buildings, will be found invaluable, and in their practical experience many well reasoned theories may yield to the test of use. It would be presumption to ignore their accumulated wisdom, even though it sometimes seems to clash with preconceived theories.

The hospital architect has developed his skill from co-operation with these people, and wherever possible he will seek the counsel and advice of such, whether the project be small or large. Such co-operation means a more successful plant when completed, and that in itself should be a measure of satisfaction to the designer. This spirit of co-operation between the architect and the administrators, building committee and whoever are concerned, requires time and tact, but it will prevent to a great degree "unbalanced hospitals."

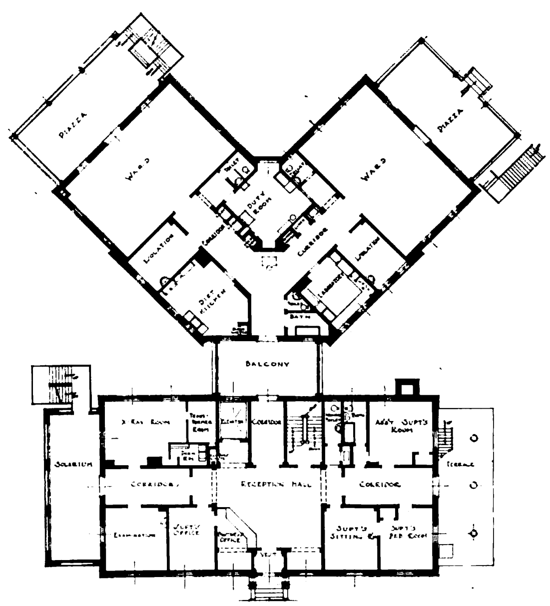


Plot Plan, Leominster Hospital, Leominster, Mass.
Kendall, Taylor & Co., Architects

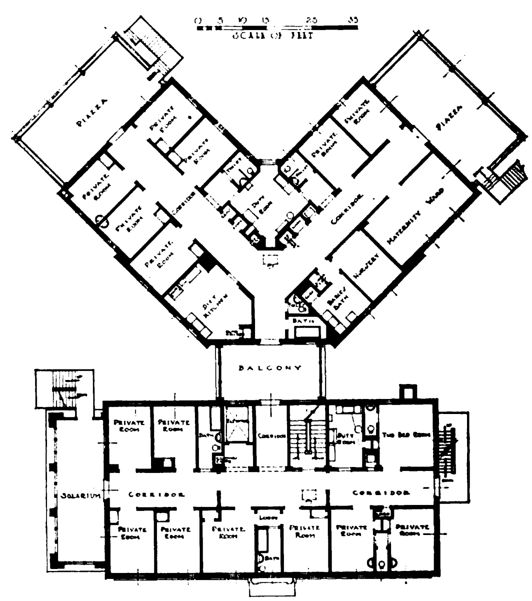
No branch of the building industry (or architecture, if it sounds more pleasing) requires more study, analysis and actual experience than the planning and the erecting of a hospital, and none is more worthy of the best thought that can be brought to bear thereon.

Let the architect remember his training and profession, be awake to all he can absorb of the continued needs and requirements of the medical profession that he may come in contact with, co-ordinate thereon, and even lead when necessary.

He should—if he can—bring to bear on a given problem all the past experience he may have been fortunate enough to acquire or able to assimilate, but ever remember that he is primarily "one versed in the art of building." The correct building of a hospital is a matter of great importance to a community, and its success depends in a large measure upon the skill of the architect who plans it.



First Floor Plan



Second Floor Plan

Leominster Hospital, Leominster, Mass.
Kendall, Taylor & Co., Architects

Details of Planning General Hospitals

By EDWARD F. STEVENS, A.I.A.
Stevens & Lee, Architects, Boston and Toronto

WITH the site selected, the preliminary survey made, and the classes of patients to be cared for determined, the problem that confronts the hospital management is the *details of planning* the various units and the relation and correlation of these general units into a complete hospital, functioning with the least friction for the care of the patients; for the whole perspective of our problem must be focused on the patient. Whatever can be done to strengthen the service or to make the way clear to the best care of the patient makes for the better hospital.

As the hospital centers around the sick patient, we may well consider the patient's quarters first; and as the patient spends the greater part of his time in bed, let us first consider the ward unit, the relation of the patient's room to the utilities and dependencies, and the shape and character of the rooms.

Wards. The rectangular or long ward, with a row of beds running along either wall, is perhaps the most common form and one which will be used where absolute economy of space is considered, for with this form of ward the entire group of patients may be under the surveillance of one person. The disadvantage of this type is its lack of flexibility, for if planned economically as a ward, it cannot be converted readily to any other purposes. In a multistory building, every story must be of the same width and shape, unless a form of construction is used as in the Harper Hospital in Detroit (Figs. 1 and 2). Here the first three stories are devoted to private rooms. The width of the building is then reduced, and the three upper floors made the proper width to care for two rows of beds.

With the square ward for a number of patients, a form which the writer found at the Rigs Hospital in Copenhagen may be adopted. By the introduction of permanent screens, a room, say 40 x 40, is subdivided into four alcoves, each of which will hold four beds, thus making a 16-bed ward as at the Bridgeport Hospital (Fig. 3), or it may be made into a 24-bed ward as in the Cumberland Street Hospital in Brooklyn by lengthening the ward (Fig. 4). The subdividing screens should be sufficiently rigid to support the bedside lights and the nurses' call, but left open at the top and bottom for circulation of air. One particular advantage of this shape of ward is that no patient faces the light and that only four patients are in one group.

The growing tendency toward smaller wards and greater privacy in our hospitals has led to the planning of smaller wards which will approximate in privacy the single room and give the ease of care of the open ward. Such a ward is designed for the new Biltmore Hospital at Biltmore, N. C. (Fig. 5).

In these cases the six- or eight-bed ward has placed at its center a sub-sink or service room, dividing the ward in two. In this sub-sink room will be a bowl, a sterilizer and a water-closet with a special bedpan emptying device. With this arrangement, the distance to be covered by the nurse in attending to her duties is minimized. To further add to the privacy and give each patient almost a private room, a permanent screen, extending from the wall at the head to the foot of the bed and about 7 feet from the floor, may be used. The screen may be made of plaster with solid 2-inch walls, and to allow more flexibility and an opportunity for sociability a door about 2 feet square is made in such a position that, when open, two patients in adjoining beds may converse as well as if the screen were not there. The two-bed, or what is generally called the "semi-private," room will always be popular.

Private Rooms. The present-day hospital demand is largely for private rooms, and many advocates of private rooms for the general hospital patients claim that the cost of building and administration of such a plan is no greater than of the ward system. To most architects, however, it is self-evident that the greater the area, the more running feet of partitions, and the more plumbing fixtures, the greater the cost. But every hospital should have several more or less private rooms where the very ill, the delirious, or the moribund patient may be placed, as well as for those whose means will allow the private room expense.

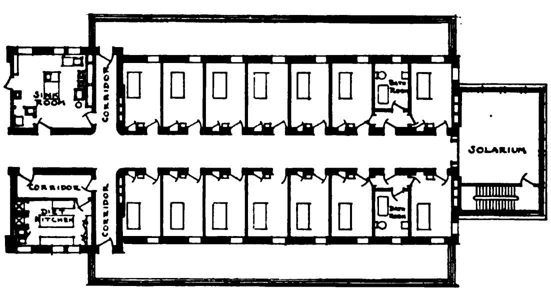


Fig. 1

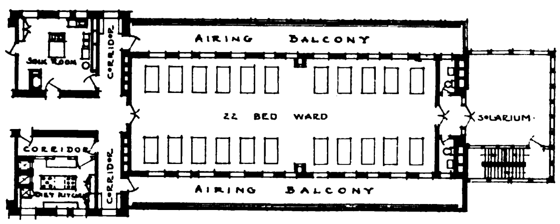


Fig. 2

Ward Plans, Harper Hospital, Detroit
Malcomson & Higginbotham, Architects; Edward F. Stevens, Consulting Architect

As far as possible the private room should have its own toilet and wash-basin. The toilets may be individual with each room, as in the Fifth Avenue Hospital (plates 89, 90), or placed between two rooms as in the Biltmore Hospital (Fig. 5). The private bath may be shared by two rooms, as shown in Fig. 5, so arranged that each room would have its own water-closet and that, by the use of a common door, the bathroom could be shut off from one or the other room. The percentage of rooms with baths may well be small, as the tub is used but little for the very sick patient.

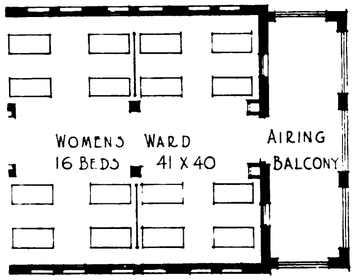


Fig. 3. Alcove Ward Plan, Maternity Hospital, Bridgeport, Conn.
Edward F. Stevens, Architect

Patient's Clothing. It is the writer's belief that in the small wards, at least, and in the private rooms, provision should be made for the patient's clothing within the room enclosure by a simple, built-in cupboard which can be easily cleaned and ventilated. For the ward patients, a patients' clothing room may be provided in some well lighted and ventilated space, and the clothing properly bagged or put in lockers.

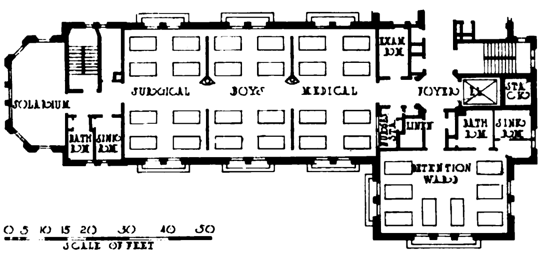


Fig. 4. Alcove Ward, Cumberland Street Hospital Brooklyn
Ludlow & Peabody, Architects

Utilities. Next in importance to the proper housing of the patient comes the service to the patient. For this, certain service rooms must of necessity be near at hand, and these are the serving kitchen, the sink or duty room, the medicine closet, the toilets and the bath. In the larger institutions, there may be added the surgical dressings room, the flower room for cut flowers, the nurses' room or station, and the housemaids' (sink) closet.

The method of serving food to the patient is one that is undergoing many changes, and it is impossible to lay down any rules that all hospitals would or could use; but the improved method of carrying food in insulated carriers and the possibility of serving the patients "direct from the wagon" make the use of the serving kitchen of less importance. Whatever the method of service, there are always occasions when some food or stimulant must be prepared, and a room with facilities for this preparation must be at hand.

The Sink Room. Whether or not there are toilets connected with the wards and rooms, the utility room or nurses' workroom is needed, for here must be facilities for washing rubber blankets, making poultices, preparing disinfectants, and sterilizing bedpans and urinals; in fact, the room becomes the nurses' workshop for all of the dirty ward work.

Toilets and Baths. With the open wards, toilets either directly connected or near by are necessary, but with small wards, where toilets are directly connected, the general toilets may be minimized or omitted altogether.

The bath, whether tub or shower, has a limited use on the general ward floor, but it should be selected with reference to the easy bathing of the patient and placed high to allow of the greatest assistance from the nurse or attendant. Where the patients cannot be trusted to bathe themselves, in some sections of the country the high or slab tub is used, giving greater freedom in actually bathing the patient. With this form the attendant stands and sprays the patient with clean water as with a shower. The shower bath is used very little by sick patients.

Nurses' Station. Just where the nurse should be stationed is a subject of much discussion—whether in a chart room set apart, where she may be quietly by herself; in an enclosed section of the corridor, with observation windows giving a lookout up and down the corridors; in the open corridor where she would have an unobstructed view of the entrances to the rooms and utilities, or, as in many foreign hospitals, in the ward proper. With private room service it would make little difference so long as the location was near the center of service, but with large ward units

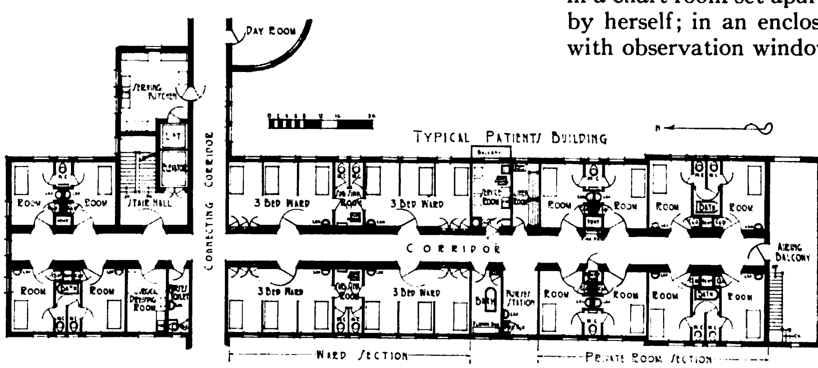


Fig. 5. Pavilion of Small Wards and Private Rooms, Biltmore Hospital, Biltmore, N. C.
Stevens & Lee, Architects

the writer feels that the nurses' station should be either in the corridor or in a booth projecting into the corridor as in the Ohio Valley General Hospital (Fig. 6) and the Ross Pavilion of the Royal Victoria Hospital (Fig. 7). Wherever this station is, at that point should be concentrated the annunciator for the patients' calls for the nurse, the telephone and the medicine cupboard.

With a predominance of large wards, the surgical dressings room is a most desirable adjunct, in fact a necessity. Here all dressings would be prepared, all instruments sterilized, and every provision made for the after-treatment from surgical operations. This room should be of sufficient size for good working space around the stretcher, a room at least 11 or 12 feet wide.

Before leaving the consideration of the ward unit, the location of the stairs and the elevator may well be discussed. These, with the serving kitchen and sink room, are the noisy parts of the hospital and should be shut away from corridors, and it is often well in small units to have the stairs and elevator in one enclosure, as in the Brandon General Hospital, shown on plate 95.

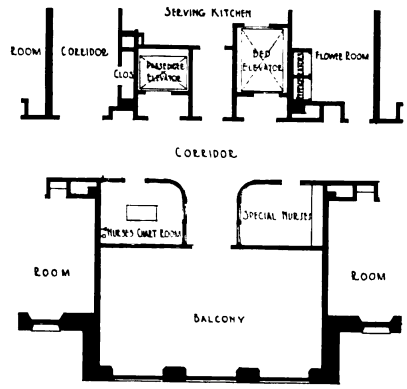


Fig. 7. Nurses' Station, Ross Pavilion, Royal Victoria Hospital, Montreal

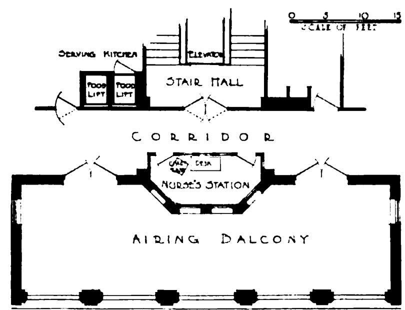


Fig. 6. Nurses' Station, Ohio Valley General Hospital, Wheeling, W. Va.
Edward F. Stevens, Architect

The Children's Ward or Section. Conditions governing the care of sick children differ so much from those governing the care of adults that a part of the hospital should be set aside for their reception and care. The nose and throat of the child seem to be fertile ground for the quick development of all kinds of maladies. A child may be entered with a well defined case of mumps, let us say, and in a few days it will be discovered that he has scarlet fever, measles or anything on the list of communicable diseases, so that the only safe and sane method of dealing with the admitting department for children is to treat them as if they had the most virulent diseases, keeping them away from other children until any latent "bug" has its chance to develop. This means an admitting department, and this department should be subdivided with screens or cubicals so that no patient may be brought in contact with another (Fig. 8). To this end, every faculty should be at hand for the proper handling of the patient,—basins with hot and cold elbow-action faucets, provision for opening of doors without touching the hand, sterilizers for bedpans, sterilizers for dishes, and in fact every provision which would be made in a well regulated hospital for the communicable diseases.

The children's ward may be much the same as that for adults, but never too large, because of the noise and confusion. The child, however, does not have the same feeling as does the adult of being "herded" if he is placed in the open ward; in fact the child is happier if he is with other children.

One important feature should be mentioned in regard to children's care; that is, provision should be made for the day- or playroom where the convalescent may have his toys, the blackboard and the "kiddie car." This room should be sunny and cheerful, with pictures on the walls, and soft, easily washable floors; in addition to this, airing balconies or out-of-door playrooms should be provided.

While in this paper the isolation department is not taken up in detail, it should be borne in mind that no general hospital is complete unless provision is made for the isolation of the occasional infection which is likely to develop in even the best regulated hospitals. This section need not be large, but it should contain room for a patient or two, and should be provided with adequate utilities for their proper care without the necessity of calling upon any other section of the hospital excepting for food supply. The most important equipment details are the sterilizers, and ample provision for washing the hands with non-hand-touching fixtures should be made.

Solarium. Solaria, as well as open air balconies, should be provided. If only a solarium is had, this should have windows which, when open, will give open-air conditions. Where it is possible to have both the solarium and the open-air balcony, it has been found that even in the colder Canadian climate the majority of patients will choose the open-air balcony. It should be remembered that a solarium at times may be overcrowded by patients, and to this end ample ventilation should be provided.

Operating Suite. The question is often asked by hospital boards, "Where should the operating room be placed?" No definite rules can be made for the location, and the answer must be governed by the size and location of the hospital. There are some conditions where the operating suite would function better on the first floor, and others where the top story would serve better.

It has been found in many small hospitals that if

the entire first floor is given up to offices, laboratories, operating and X-ray service rooms (in other words, if this floor is made the "workshop" of the institution), better results can be achieved, for the upper floors may then be given over entirely to patients. This is particularly true in the small hospital plan when possible.

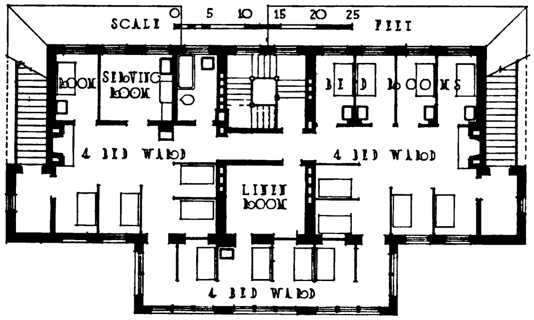


Fig. 8. Admitting Department of a Children's Hospital

With the larger units, however, it is often found that the upper floor will function better, and in many cases a separate building may be provided, but wherever located, certain elements are necessary:

Operating room.
Sterilizing room.
Anesthetizing room.
Nurses' workroom.
Surgeons' room.
Surgeons' scrub-up.

These may be increased as necessity dictates, and the number of rooms must be governed not by the number of patients in the institution but by the number of the staff who wish to operate at the same time. It will be noticed in the great hospitals of Europe that the operating rooms are fewer in number than in institutions the same size in the United States. In illustration of this point may be given a few notable examples: the Virchow at Berlin, with its 2,000 or more patients, a large percentage of whom are surgical, has but four operating rooms, one of them for known septic cases; in the Munich-Schwabing, with 1,000 beds, there is but one for clean operations. In this country, on the other hand, we find in many comparatively small hospitals a much larger number of operating rooms. In the Massachusetts General Hospital (not including Phillips House, which is a hospital in itself) with 250 beds, there are five operating rooms besides those in the accident and orthopedic departments; the Grace Hospital at Detroit has four operating rooms, besides surgical dressing rooms; in the Youngstown Hospital, with 150 beds, four operating and two accident rooms are provided; the Peter Bent Brigham Hospital in Boston, with 225 beds, has three operating rooms, and the Bridgeport Hospital, with 200 beds, has three operating rooms.

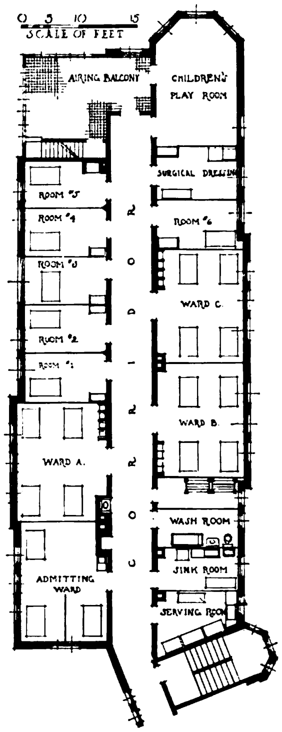


Fig. 9. Children's Wing
Henry Heywood Hospital
Gardner, Mass.
Edward F. Stevens, Architect

An operating room for general operations need be no larger than 16 x 20, or having from 300 to 350 square feet. Anything beyond this, excepting for observation space, is waste of room. The day of the amphitheater for operating has gone as a method of teaching, and in clinical hospitals the students are grouped around the operator or upon raised platforms or seats which may be moved from one position to another. Where students attend operations it is desirable to provide separate approaches to the observation stands or platforms, either by narrow corridors, as shown in the plans of the Geisinger Memorial Hospital (Fig. 10) and the City Hospital, New York (Fig. 11), where the student or visitor enters the operating room at the rear, or, as in the case of St. Mary's Hospital at Rochester, Minnesota, where the visitor enters from a mezzanine story. Because of the likelihood of condensation, the placing of glass between the observer and the operator does not always give the best results. The Polyclinic in Rome and the Bispebjerg in Copenhagen are two examples of operating rooms treated in this way.

The important item in operating room construction is the lighting. A direct north light is desirable, and it has been found that the vertical window, extending far enough above the normal height of the ceiling to give a direct light, has proved very satisfactory and is largely replacing the skylight. For artificial lighting, most surgeons prefer a diffused light, and this can be obtained by the placing of four, six, or more semi-reflecting ceiling lights on either side of the operating table, but not over the table. Every hospital of any size should have at least one operating room which may be darkened for eye work, and a small room set aside for plaster work is almost an economic necessity.

Where the plan will permit, the anesthetizing rooms should join the operating rooms. Authorities differ as to the location of the sterilizing rooms. If there are but two operating rooms, a position between the two is quite desirable. If there are many, a small instrument sterilizer in the operating room may be desirable; if the work is to be done in one room, several sterilizers may be used. The bulk sterilizing of dry goods may well be done out of the operating area. The water used in the operating room may be rendered sterile by repeated boiling or distilling. The writer believes that this can be best prepared outside the operating suite and conducted

in tin-lined pipes to re-heaters and dispensed in each operating room and wherever needed in the hospital.

While it is true that many surgeons advocate that the "scrubbing up" before operation be done in the operating room, what seems to be more satisfactory in many cases has been to set apart a portion of the corridor or an alcove from the corridor for this purpose. This leaves the operating room free for strictly surgical purposes. With the sterile water tap for occasional rinsing, the need of the large scrub-up basin in the operating room is avoided.

In the nurses' workroom should be space for making up surgical dressings, the cleaning of instruments, scrub-up provision for the nurses, and the general workroom of the department. In the surgeons' room should be the private lockers for the clothing of the operating staff, comfortable chairs, toilets and showers. The surgical instruments may be kept in a separate instrument room or in cabinets in the operating rooms or corridor.

The Library. Too little thought is usually given to provision of reading matter for the patients. In some hospitals provision is made for the hospital library, and books are brought to the patient; in others, portable bookcases on wheels, upon which the books and magazines are arranged, are wheeled to the bedside and the patient given the opportunity to make a selection from the library shelves.

For a patient weakened by sickness the bound book or the magazine with its large proportion of advertising matter and its stiff binding is often too heavy to hold, and the writer believes this problem has been nicely solved by an ex-patient and member of the Ladies' Board of Managers of a New England hospital by making careful selections of single stories from magazines, cutting them out and neatly enclosing them in stout covers with the name of the story, its author and the magazine from which it was taken. These she has named the "*Pass It On*" library. If there is a social service worker in the hospital, the library may well be left in her hands, as it will give additional opportunity for more intimate conferences with the patient.

Administration Quarters. The administration has been considered last—not that it is the least important, but because the hospital is primarily built around the patient. We have considered most closely that portion of the hospital concerning the patient and his immediate welfare while he is in the hospital, and the administrative portion is the last place he visits when he is leaving and paying his

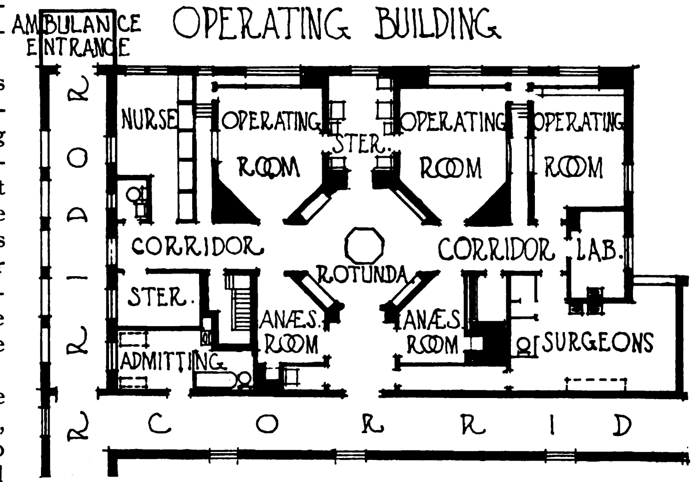


Fig. 10. Operating Department, Geisinger Hospital, Danville, Pa.
Edward F. Stevens, Architect

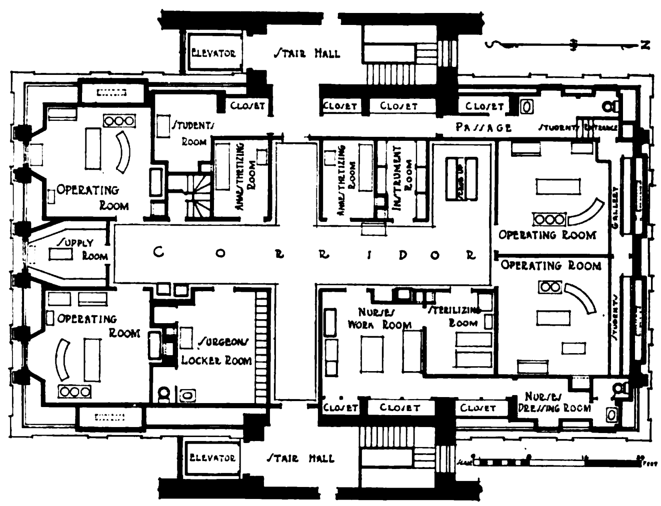


Fig. 11. Operating Department, City Hospital, New York
Charles B. Meyers and Edward F. Stevens, Architects

bill. We find the administration unit in nearly every part of the hospital, but where planning will permit, a central location is desirable. It is in this section that inquiries are made, the consultations held, and the general machinery of the hospital directed, so that a central location is most convenient.

Upon the size of the hospital depends the size of the administration unit, for here not only the bookkeeping and accounting are done, but here also are located the headquarters of the superintendent, the superintendent of nurses, and the social service worker. Here the directors of the hospital will hold their conferences; here the information desk and the telephone switchboard, the staff rooms and the hospital library are located. Under some circumstances a separate building for the administration will function to the best advantage and may be combined with the housing of the internes, lecture rooms, etc.; but where the strictest economy must

be maintained, it is generally found that a portion of the entrance floor of the hospital can best be utilized.

In the Ottawa Civic Hospital the administration unit is developed in the center of the H-shaped building (Fig. 13), and owing to the fact that two lines of service for the building are designed at the crossing of the pavilions, the center portion of the entrance floor need never be made a thoroughfare for the wards in the east and west pavilions. Another small unit is shown in the Brandon General Hospital.

If the hospital chances to be a memorial building, where the memorial feature should be emphasized, this emphasis can be made in the entrance to the administration unit by a larger and more spacious room, with space for tablets and other architectural features.

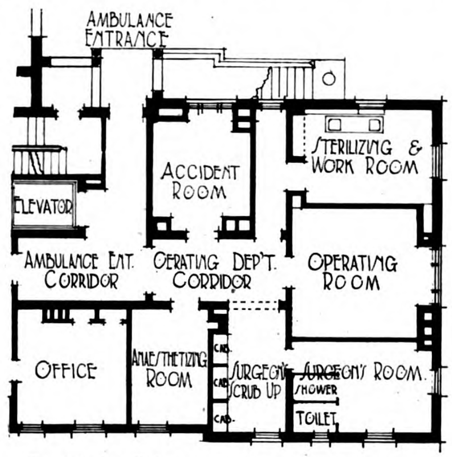


Fig. 12. Small Operating Department, Mary Lane Hospital, Ware, Mass.
Edward F. Stevens, Architect

Intercommunicating Means in Hospitals. With the type of ward or private rooms determined upon and the service portion planned to function for these wards, an important part of the plan is the intercommunication, not only between one section and another, but between wards and corridors and between one room and another. In planning the hospital, we should always bear in mind that the patient is being taken through these corridors and wards, not as we would walk through a hotel but either on a stretcher or, more likely, on the hospital bed. For that reason the width of the corridors must be such that a bed which is 6½ feet long and diagonally something over 7 feet may be turned within this corridor. The doors to all of the patients' rooms should also be of sufficient width for these beds to pass through. Nearly every bed is at least 3 feet wide. There are projections on the bed which would make necessary an additional 2 or 3 inches, so that for doors entering the wards and private rooms 3 feet, 8 inches or 4 feet is none too much for easy communication.

The approach to the elevator is just as important, and the elevator itself should be made sufficiently large to take the bed with its attendants. Likewise the doors of the elevator must be wide enough for the passage of this bed.

Operating Room, Maternity Hospital, Bridgeport, Conn.
Edward F. Stevens, Architect

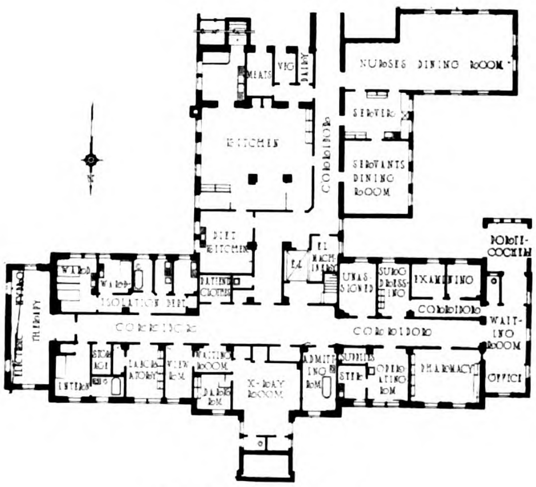
If, as often happens in the adding of new buildings to old, a change of level is necessary from one portion of the building to the other, this should always be managed by ramps and not by stairs, and these ramps should be with not over 5 to 8 per cent rise.

Service. Kitchen. The three important elements in the care of the patient outside of housing, medical and nursing care, are to properly feed, warm and provide him with clean linen. Provision for these may or may not be located within the main buildings of the institutions, but the kitchen, at least, should be sufficiently near to make the dispensing of palatable food possible.

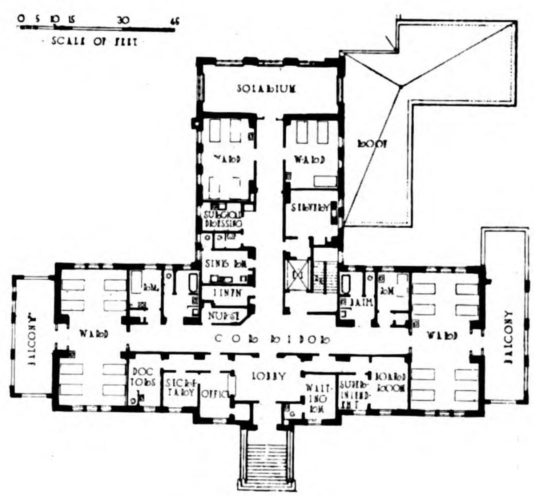
With gas, steam and electricity at hand and the vast variety of labor-saving devices for preparing food, there is no excuse for food improperly cooked or served. The kitchen must be planned for economic service from the receiving of raw supplies to the service of the patients' trays. Plan the kitchen as you would a factory for the conversion of the raw products to the palatable food. Avoid "cross currents" of service; don't mix the washing of pots and pans with the making of "puff paste," and when the food is ready to be served it should reach the patient quickly without deterioration. Steam tables, toasters and cookers, food carriers and dishwashers of approved pattern, are all important factors. Not only the reception and preservation of food supplies are necessary, but the hygienic disposal of the garbage and refuse must be considered.

In the illustration of the Quincy Service Building (Fig. 14) the method shown for the disposal of "waste product" provides for (a) An incinerator connected with the heating flue and ap-

GENERAL EXTERIOR VIEW



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

BRANDON GENERAL HOSPITAL, BRANDON, MANITOBA

STEVENS & LEE, ARCHITECTS

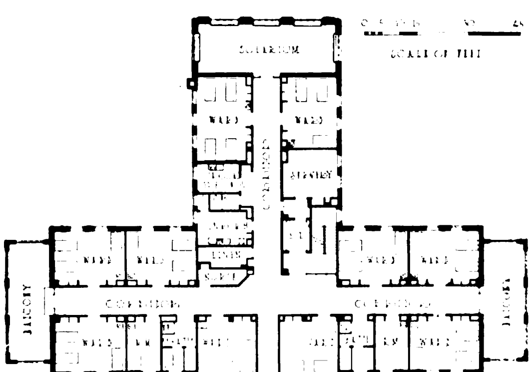
DAVID MARSHALL, ASSOCIATE ARCHITECT

BRANDON GENERAL HOSPITAL
BRANDON, MANITOBA

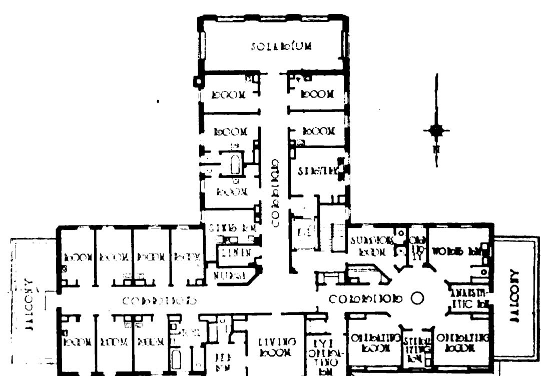
Illustrations on Plate 95

Type of construction. Fireproof
Exterior walls. Brick veneer with tile backing
Roofs. Felt and gravel
Floors. Terrazzo, cement and linoleum
Heating. Forced hot water
Ventilation. Fans for kitchen and toilets; wards by gravity
Windows. Double sliding (box frames with four sashes)
Area of building. 11,000 sq. ft.
Cubage of building. 473,200 cu. ft.
Date of general contract. May, 1921
Cost of building proper. $275,930
Cost per cu. ft. 58⅓¢
Number of beds. 70
Cubic ft. per patient. 6,770
Cost of operating per day per bed. $2.45

This construction includes kitchen. Laundry and boiler room provided in separate building.



SECOND FLOOR PLAN



THIRD FLOOR PLAN

proached from an independent passage where all hospital refuse may be incinerated; (b) provision for the temporary "housing" of what is called "garbage" in a section of the main refrigerating area in such a way as to prevent its disintegration.

In transporting the food from the kitchen to the patient, the modern insulated food carrier is used to advantage. In the service building would be located the dining rooms, the serving rooms and food storage, hot and cold. A refrigerating plant is not only desirable but is an economic factor. The teaching of dietetics may be in the main kitchen or in a laboratory in the nurses' home.

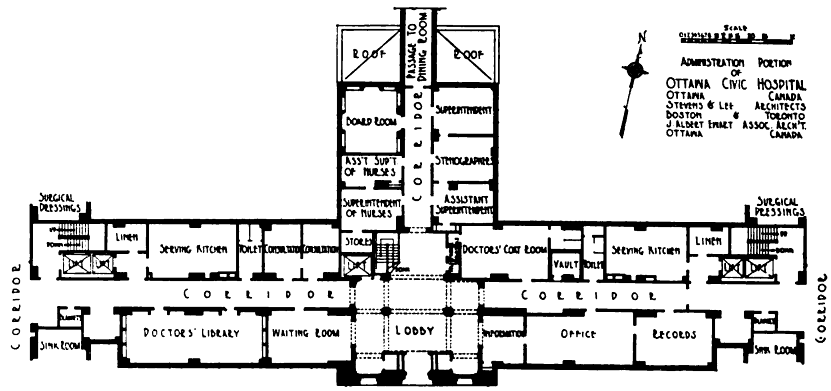
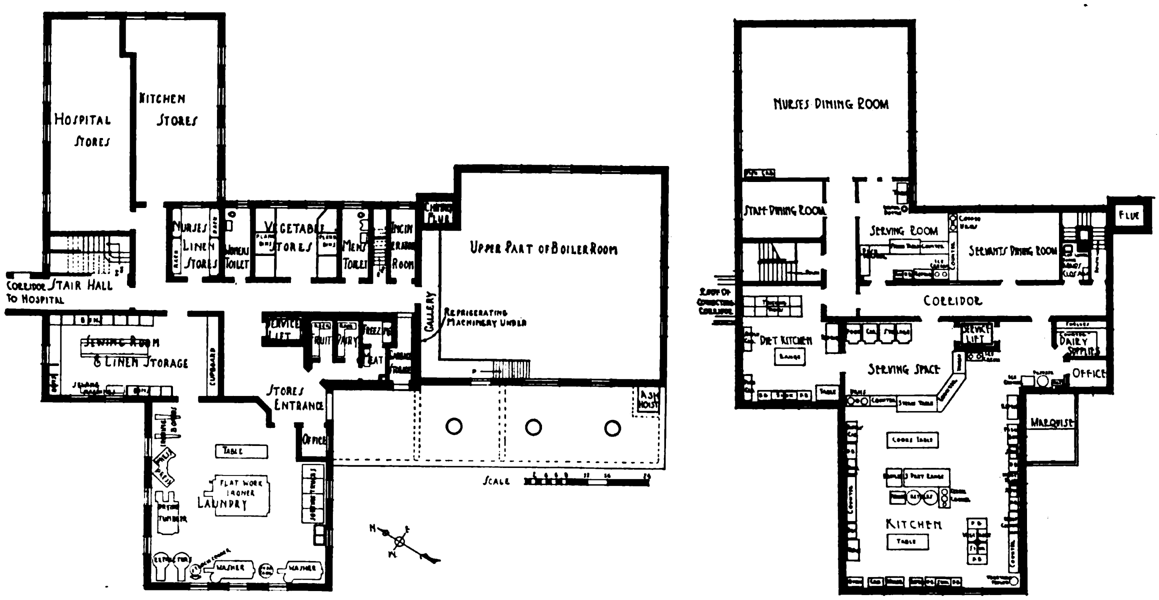


Fig. 13. Administration Department, Ottawa Civic Hospital, Ottawa, Canada
Stevens & Lee, Architects; J. Albert Ewart, Associate Architect

Laundry. The location of the laundry must be determined by the needs of the institution, the available space, and the quantity of work to be accomplished. In a hospital on a restricted site, the laundry, if well ventilated, may be placed within the hospital area; but where space permits, it is desirable to have this work done in a separate building. This may be often done to advantage, as in the case of the Quincy City Hospital (Fig. 14), where a service building is provided in connection with the kitchen and heating plant.

The "wet work" of washing, starching, extracting, etc., should be kept by itself and should be so arranged that the clothes will pass readily from one machine to another,—from the washer, extractor, flatwork ironer, drying tumbler, steam press and ironing boards, on to the clean linen room. In the "wet" portion, the floors, of course, must be of some moisture-resisting material, but in the section where the ironing is done it is important that a resilient floor be provided.

Heating Plant. With small plants, the heating may well be placed in the main building, but with an increase in the needs of this department not only for heat but for cooking, sterilizing, ventilation, and often for power and refrigeration, it becomes desirable to make a separate building which may function as a heating plant or in combination with the kitchen and laundry, as at Quincy (Fig. 14). With the three sections of this hospital service, high pressure steam is the main element used. The electric plant and the refrigerator plant may both come within this unit. The location of the heating plant, with its necessarily smoke-giving chimney, should be considered in reference to the prevailing winds.

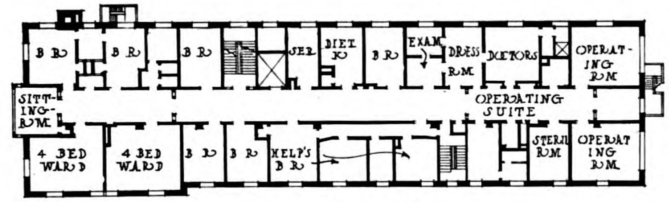


First Floor Plan Second Floor Plan

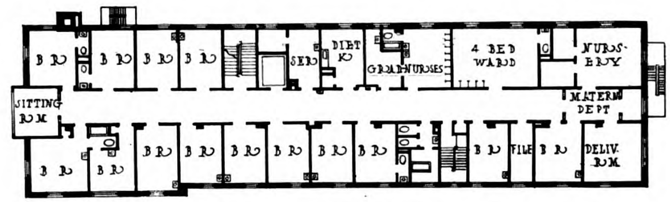
Fig. 14. Service Building, Quincy Hospital, Quincy, Mass.
Stevens & Lee, Architects

THIS hospital possesses particular interest as being an excellent example of its class. Built with a view to enlargement, it is so planned that a wing of the same size as that already built can be erected on the opposite side of the entrance pavilion, considerably more than doubling the hospital's capacity, since the present administrative departments are sufficient for a much larger hospital.

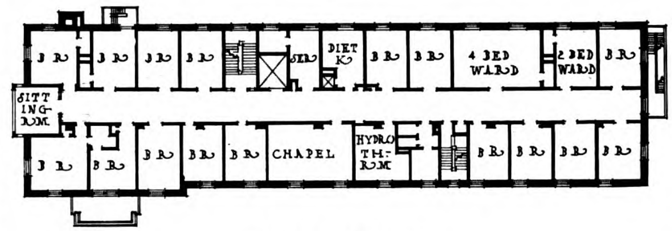
Built of brick and of fireproof construction in 1918 at a cost (excluding equipment) of $217,055, the hospital contains a cubage of 458,000 cubic feet —about 46½ cents a foot, and accommodates 100 patients.



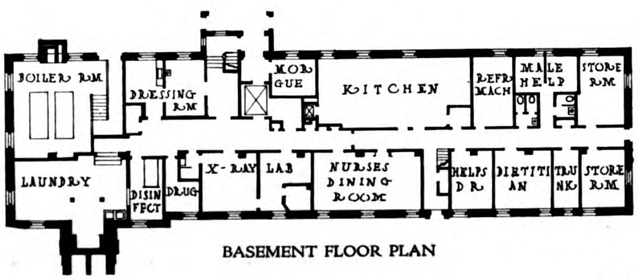
FOURTH FLOOR PLAN



THIRD FLOOR PLAN

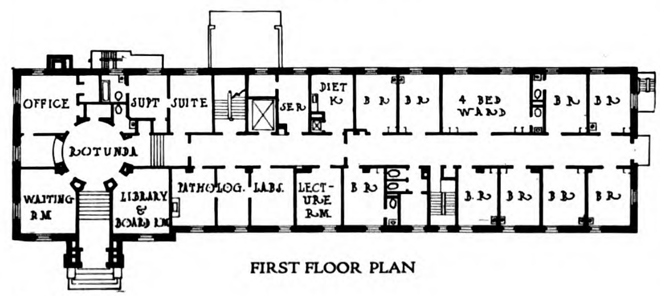


SECOND FLOOR PLAN



BASEMENT FLOOR PLAN

ENTRANCE PORCH



FIRST FLOOR PLAN

ST. LUKE'S HOSPITAL, DAVENPORT, IA.
TEMPLE & BURROWS, ARCHITECTS

Some of the Special Departments of a General Hospital

By WILEY EGAN WOODBURY, M.D.
Director, Fifth Avenue Hospital, New York, and Consultant on Hospital Construction

NOTHING in the designing of the modern hospital of today is greater in importance than the early consideration of the needs of a community, and this requirement will likewise play an important part in the planning and arrangement of the special departments and rooms of a general hospital.

Before attempting to outline and locate these units, one should have a definite idea of the kind of service required to meet the needs of the particular hospital in question, and even this will not be sufficient unless the relationship between all departments is thoroughly understood. It is a well known fact that unless one clearly visualizes in the blueprint every procedure in connection with the care of a patient, the several departments, when constructed, will not function to the best advantage.

The magnitude of the subject will of necessity limit these remarks to a brief outline of the special departments in question, but it is to be noted that the necessary details, purposely omitted from the text, are found in accompanying sketches of floor plans of typical large and small installations.

The biological laboratory of the general hospital is more closely related to all the patients' departments than is any other of the special departments. The modern hospital provides something more than the means of curing disease, and for this reason we first turn to the laboratory for guidance in the care of patients. This general demand for service necessitates the selection of a readily accessible location, preferably one providing light on at least three sides; whether this be in a separate unit, as is frequently the case in the pavilion type of hospital, or in one of the wings of the cubicle type, is not important. In selecting the location, however, there are many points to be considered. Providing for future expansion will always be a problem. Proper facilities must be provided for the care of animals used in connection with laboratory work. Any oversight relative to these requirements will always prove embarrassing.

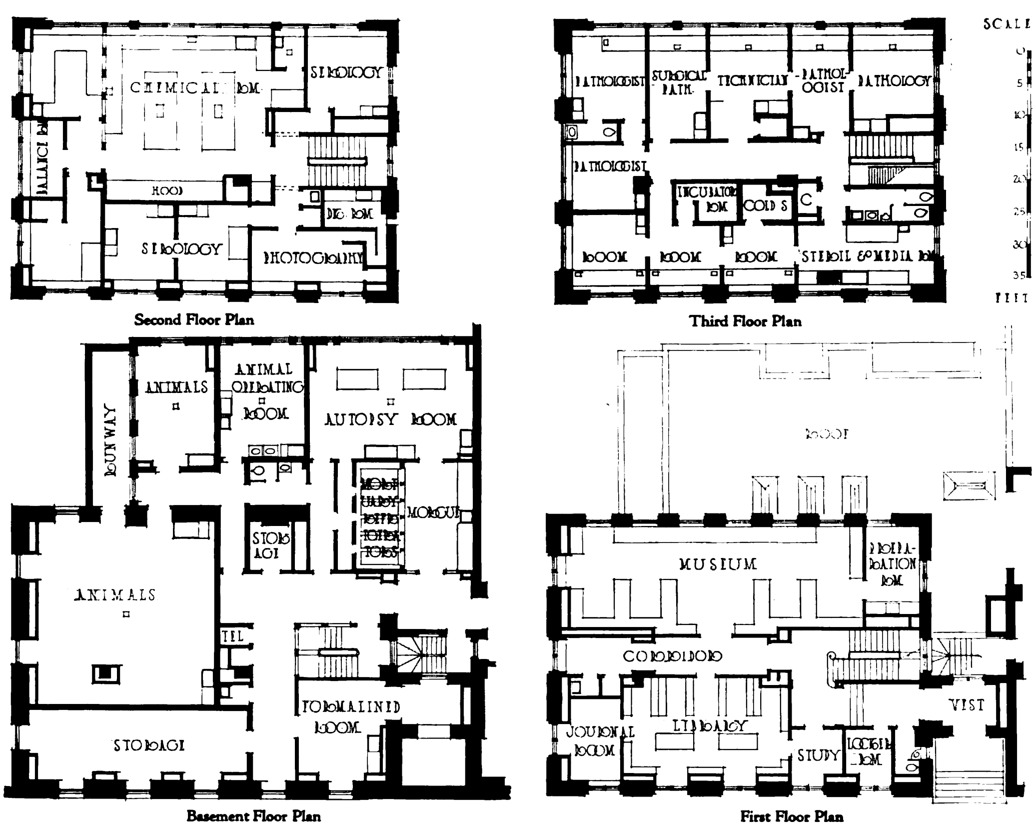


Fig. 1. Pathological Laboratory, Mount Sinai Hospital, New York
Arnold W. Brunner, Architect; S. S. Goldwater, M.D., Consultant

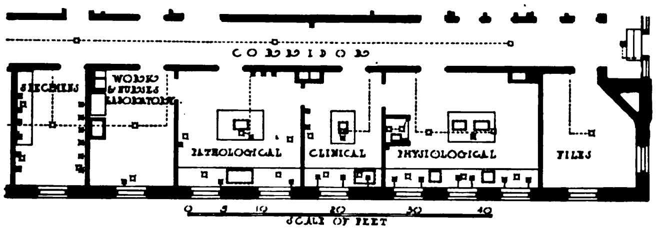


Fig. 2. Plan of Laboratories, Beverly Hospital, Beverly, Mass.
Haven & Hoyt, Architects

The floor plans designated as Fig. 1 are particularly well adapted to the large institution, and while in this instance the laboratories are located in a separate pavilion, the general scheme lends itself quite readily to the hospital of cubicle type. In many of the smaller institutions a tendency is noted to place the laboratory on the first floor or in the basement, and frequently this department is operated successfully on the upper floors. When there is a comparatively large outpatient department, with diagnostic clinic located in the basement, it is advisable to arrange for the laboratory near by, but if this feature is not to be considered, there is no reason the upper floor site should not be favored. The plan presented in Fig. 2 provides for all of the well recognized laboratory features, and appears to be well adapted to the needs of the small general hospital. In this plan the laboratory is in the basement.

The X-ray department plays an important part in the diagnosis and treatment of disease. In the planning of this department, the rapid progress which is being made in connection with the use of the Roentgen rays brings to light no end of complications. The question of location involves a far more serious problem than that of accessibility to the patients' departments. Heretofore, construction for the protection of the operator has been planned, but with the advent of the deep therapy machines the problem must be considered of protecting other persons in adjoining rooms from the injurious effects of the ray. Some authorities continue to rely on the use of lead for insulating purposes, by simply increasing the thickness of the sheet and expanding the areas to be covered, while others, in addition to using the lead sheets and in order to secure the advantages of atmosphere as an insulating agent, advocate the use of a separate building. It is too soon, however, to form any definite conclusions regarding this particular phase of the question of location, but in any event one should not be unmindful of the dangers involved.

The plan designated as Fig. 3 shows an X-ray department well adapted to the needs of a large hospital, while Fig. 4 is recognized as better suited to the smaller institution.

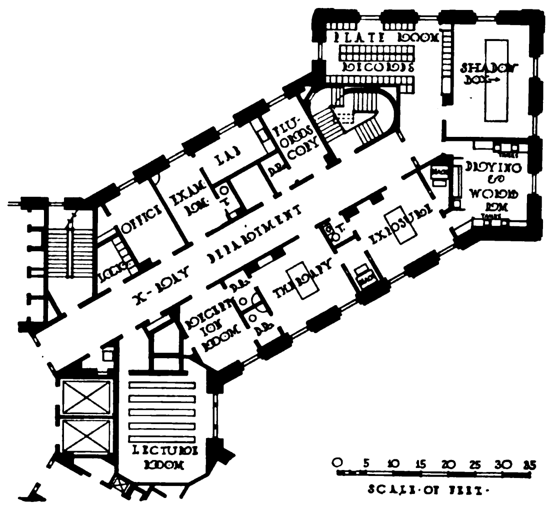


Fig. 3. X-ray Department of Fifth Avenue Hospital, New York
York & Sawyer, Architects; Wiley E. Woodbury, M.D., Consultant

The Maternity Department. In no other single department is encountered the combined difficulties of serving both the adult and the infant. The maternity department of the modern hospital is in reality a hospital within itself, and the person responsible for the planning of the unit will do well to keep this thought foremost in mind. It is in this department that the pre-natal care of both mother and infant must be arranged. The necessary attention during the first two stages of labor, the delivery room service at time of birth, and the many phases of after-care for both mother and child are all equally important. No other service in the hospital combines so many problems.

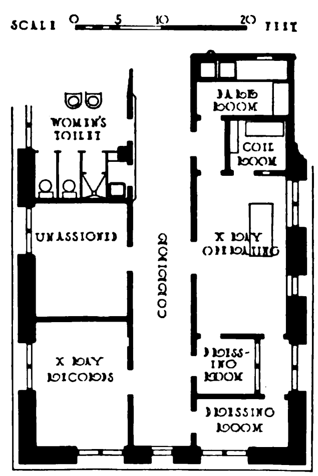
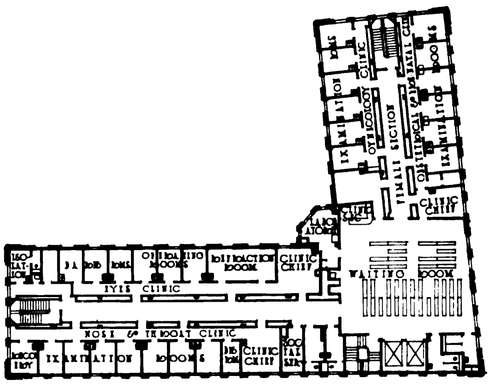
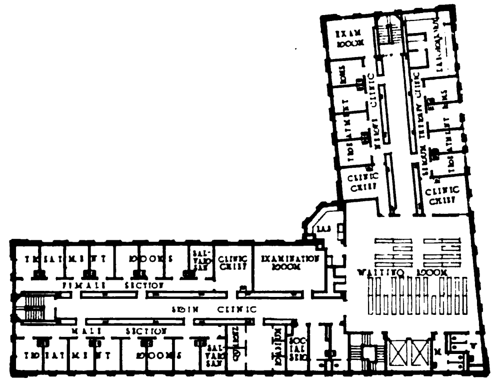


Fig. 4. X-ray Department, Union Benevolent Hospital, Grand Rapids
York & Sawyer, Architects

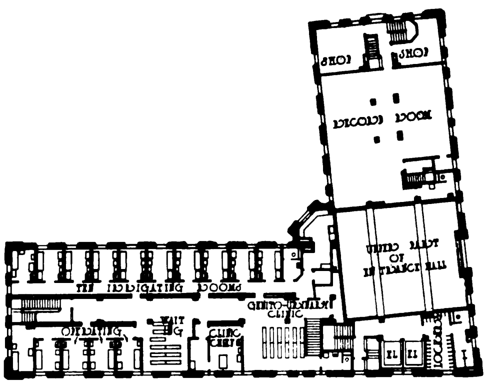
For obvious reasons details must be omitted, but it is desirable to emphasize these points: The pre-natal care of the newly admitted patient demands privacy, quiet and pleasing surroundings, and only in the carefully arranged private room may this aim be accomplished. Special attention should be given to the color scheme; glaring white walls and white enameled furniture are suggestive of sickness. The modern hospital inclines to use of the cheerful tints of buffs and tans; in short it provides a room that resembles as nearly as is practicable in hospital service the bed-



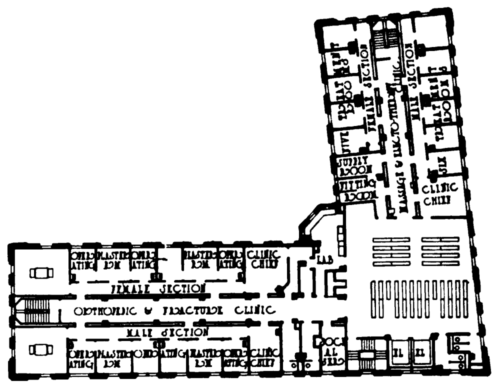
FIFTH FLOOR PLAN



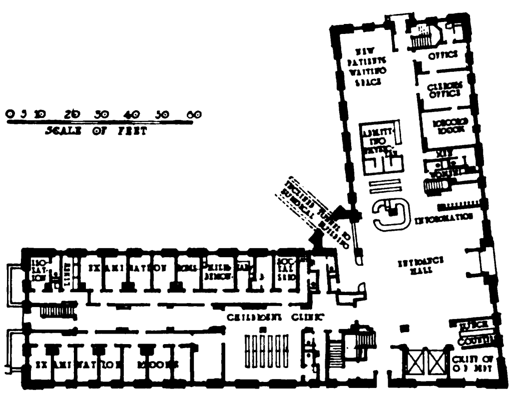
SIXTH FLOOR PLAN



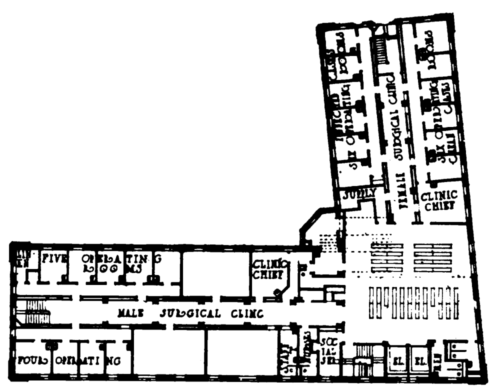
MEZZANINE FLOOR PLAN



THIRD FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN

Fig. 9. A highly developed out-patient unit occupying seven floors. The fourth floor (not shown) is devoted to the medical clinic and is similar in general arrangement to the third floor

OUT-PATIENT DEPARTMENT, BOSTON CITY HOSPITAL, BOSTON

COOLIDGE & SHATTUCK, ARCHITECTS

room of the well kept private home.

In order to insure quiet, one should arrange for the segregation of the three classes: viz., the newly admitted patient; the mother in labor, and the new born infant. The plan presented plainly shows just how this has been accomplished in the Fifth Avenue Hospital, New York. The newly admitted patient is placed in a single room on the front side of the building, while the labor rooms which have been treated with a sound-deadening material are located in a rear wing, adjoining the preparation and delivery rooms. The nurseries, which have also been treated with sound-deadening material, together with isolation rooms, superheated rooms for prematurely born infants, steam heated linen supply closets, bathrooms and isolation units for infants, occupy a rear wing opposite the labor rooms just mentioned. The supervisor's office, visitors' reception room, service pantry, elevators, etc., are located in the center of this unit. The accompanying plan (Fig. 5) shows a completely equipped department of 35 beds, each patient occupying a single room.

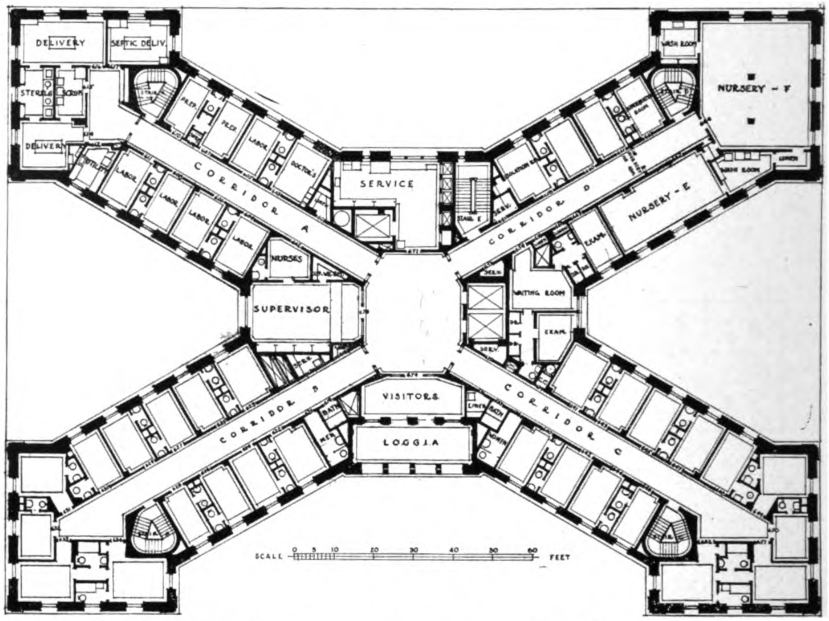


Fig. 5. Maternity Department Plan, Fifth Avenue Hospital, New York
York & Sawyer, Architects; Wiley E. Woodbury, M.D., Consultant

Orthopedic Department Workrooms. The special workrooms used in connection with the orthopedic department are generally located in the basement, although occasionally it may be practicable to place them in a detached building. The plan submitted (Fig. 6) gives a good idea of space requirements for these: the brace shop, equipped with the different kinds of mechanical appliances; the forge shop; the polishing and grinding room; the leather room; the stock room and the general store room and office.

Hydrotherapeutic Department. Although the idea of the "water cure" found its inception in the medicinal pools of biblical times, it remained for the German scientists to develop the school of Hydrotherapy. That this form of treatment found favor in certain parts of Europe is evidenced by the prosperity attained by some of the famous watering places of Germany, and no doubt this feature is largely responsible for the strenuous efforts that have been made to establish similar institutions in America. The general hospital can not carry out hydrotherapeutic treatment on so large a scale, and for this reason one must turn to the several types of mechanical devices for whatever aid is to be obtained from hydrotherapy. Charlatanism and quackery practiced in connection with the use of this well recognized therapeutic agent are largely responsible for its lack of popularity in general hospitals, but in the hands of the well trained, honest practitioner of internal medicine, hydrotherapy means something real, and the completely equipped modern hospital will do well to provide a special department for this work. The plan included here (Fig. 7) conveys a good idea of the requirements of floor space for the several pieces of equipment.

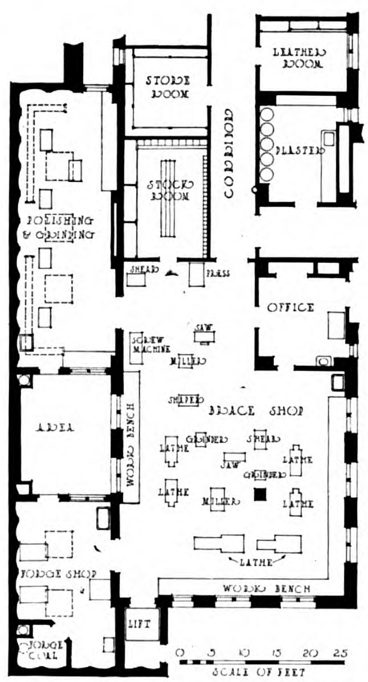
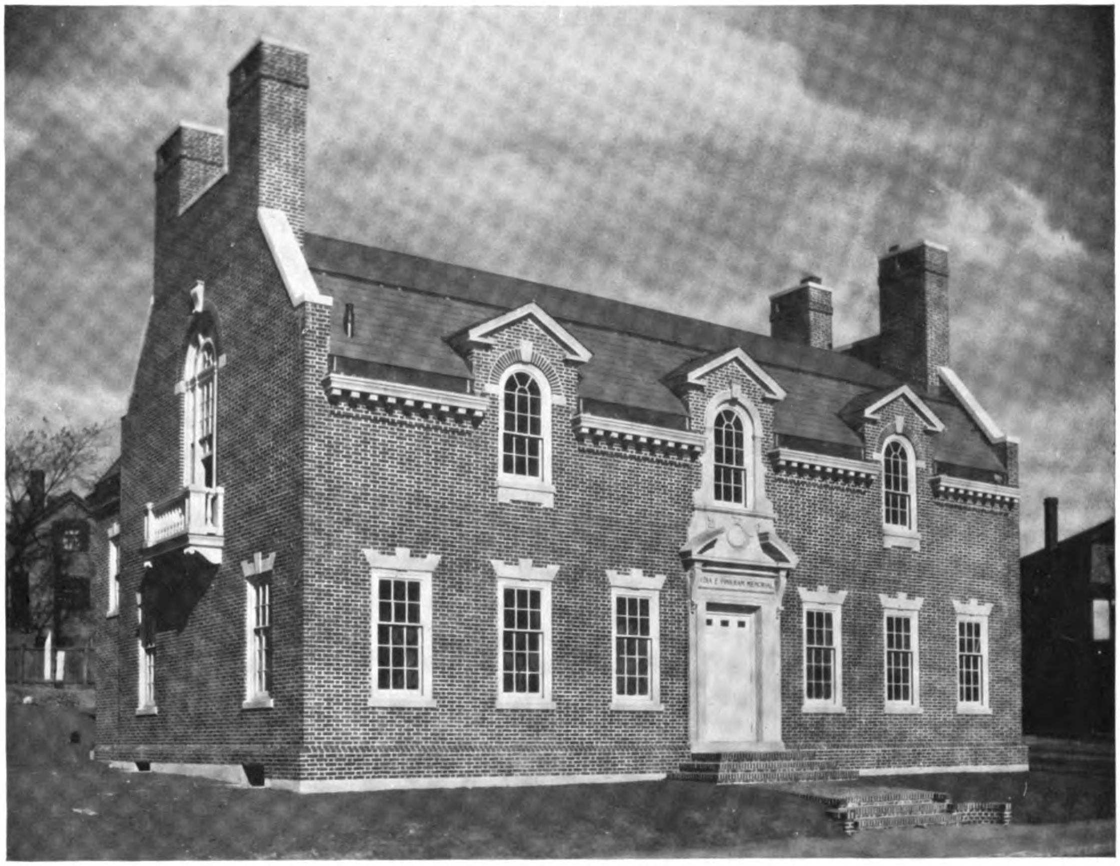


Fig. 6. Plan of Orthopedic Workrooms
York & Sawyer, Architects

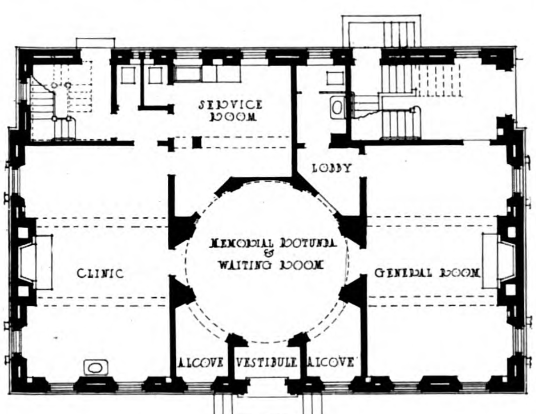
Isolation Department. The location of the isolation department of the general hospital may be largely governed by local

(Continued on page 276)

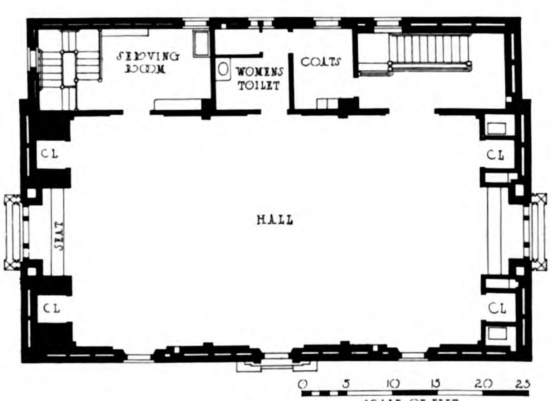


GENERAL EXTERIOR VIEW

THIS building is a clinic for the treatment of infants. It has no beds, private rooms or ward service, and is intended for the use of out-patients only. Brick is used for the exterior walls, and the construction is fireproof, excepting the roofs which are of wood and covered with slate. Floors are of concrete; heating is by indirect and direct steam; ventilation is of the gravity type, and wooden sash are used at the windows. The clinic, built in 1922, contains 2,110 square feet, and cost (not counting equipment) $41,229, or 63 cents per foot for 65,400 cubic feet.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

PINKHAM MEMORIAL CLINIC FOR BABIES, SALEM, MASS.

HAVEN & HOYT, ARCHITECTS

health laws. In some communities the city health ordinances require that the isolation department be placed in a detached building. Others permit the use of a portion of a building, providing that the only communication therewith is from the outside. In still other communities a single room or series of rooms well isolated from the patients' departments will serve all of the ordinary purposes of an isolation unit.

It seems desirable to point out that the needs for an isolation department are so many and so varied in the different communities that one should have a comprehensive idea as to the requirements of service and the provisions of the sanitary code before attempting to suggest a location for this unit. When it is to be used for the temporary isolation of an infected case, pending immediate transfer to a contagious disease hospital, then the elaborate structural efforts of the past are not required, and the properly isolated single room is sufficient. But in the case of the general hospital serving a community which does not provide a special contagious disease hospital, an isolation unit should be provided, either detached from the main building or so placed that natural isolation of the building is insured. The accompanying plan (Fig. 8) represents a highly developed isolation unit in a detached building.

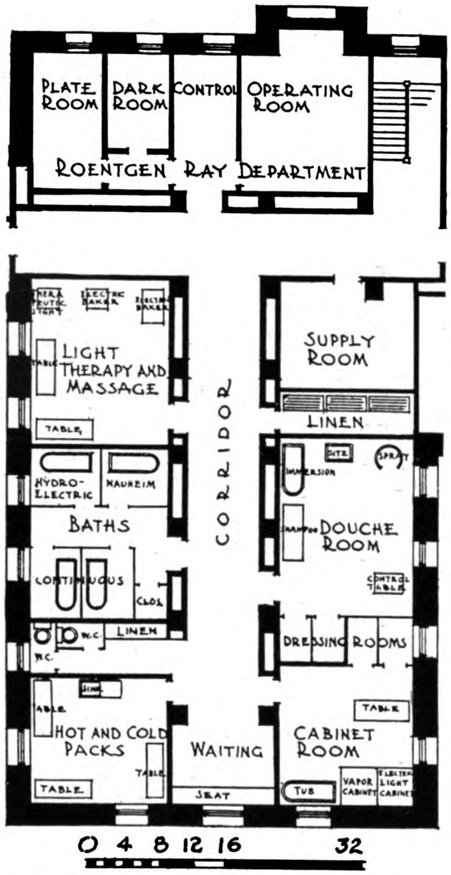


Fig. 7. Plan of Hydrotherapy Department, Ross Pavilion, Royal Victoria Hospital, Montreal
Stevens & Lee, Architects

The out-patient department with modern facilities for diagnosis enables the hospital to reach countless numbers who might otherwise be unable to secure medical attention.

In connection with the location of the out-patient department it seems desirable to point out that one of the first persons to be considered is the out-patient himself. The ideal plan for the large hospital calls for a completely equipped unit in a separate building, readily accessible to the highway and to the hospital proper, and so located that natural ventilation and sunshine may be had from all quarters. The entrances and exits for patients should be arranged so that this group will not come in contact with the hospital proper.

The foregoing description refers to the completely equipped unit; that is, one possessed of all of the diagnostic facilities to be found in a modern hospital. But when for reasons of economy it is desirable to omit from the out-patient unit some of the diagnostic departments, such as X-ray, laboratory, etc., the hospital facilities must be properly utilized, and the question of location is influenced accordingly.

In the past an attempt has been made to confine this department to the lower floors, but owing to the demands for increased floor area and because of lack of ground space some of the large hospitals have found it necessary to erect higher buildings, utilizing all floors. This radical change in plan of construction is necessary in certain instances, but it is a fact that when the lines of travel are modified in this manner, that is, the horizontal plane is shortened and the perpendicular line is lengthened, the costs of construction and maintenance are materially increased. The fact should be kept in mind that the out-patient department is called upon to handle a large number of people in a comparatively short period of time, and the problem of transportation is made more difficult when the lines of travel, as just indicated, are changed.

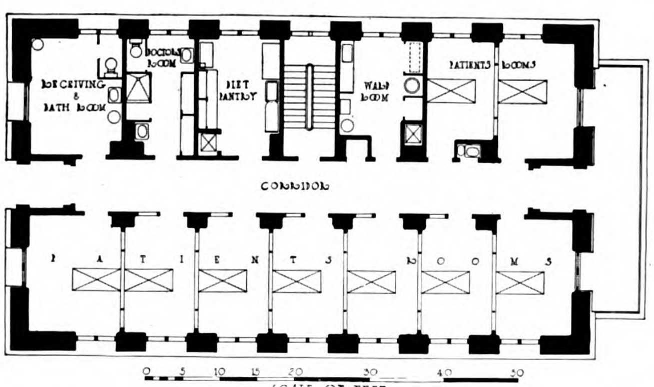
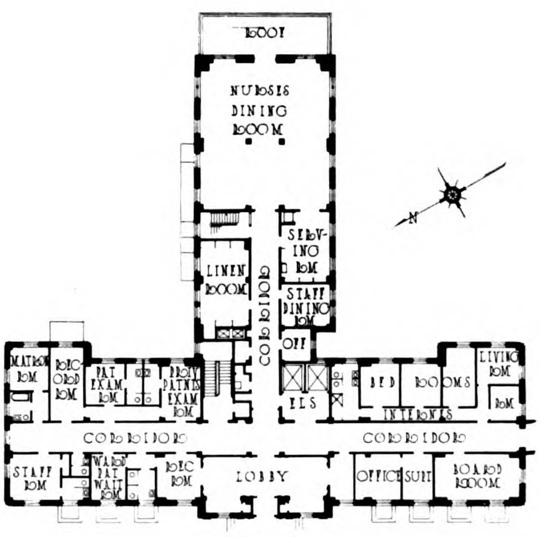
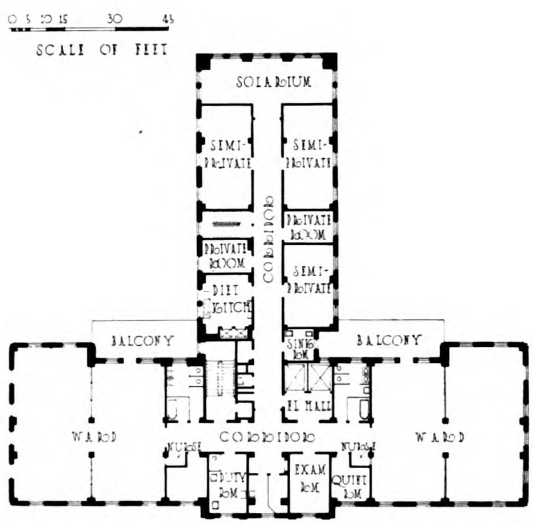


Fig. 8. First Floor Plan of Isolation Building, Rockefelleer Institute for Medical Research, New York
York & Sawyer, Architects

PERSPECTIVE VIEW OF EXTERIOR



FIRST FLOOR PLAN



SECOND FLOOR PLAN

HACKENSACK HOSPITAL, HACKENSACK, N. J.

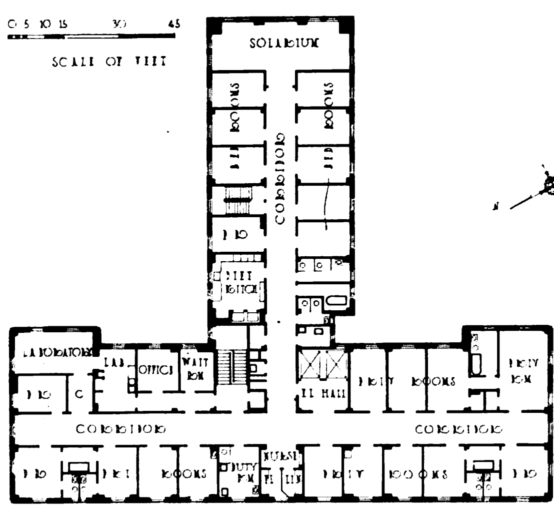
CROW, LEWIS & WICK, ARCHITECTS

HACKENSACK HOSPITAL
HACKENSACK, N. J.

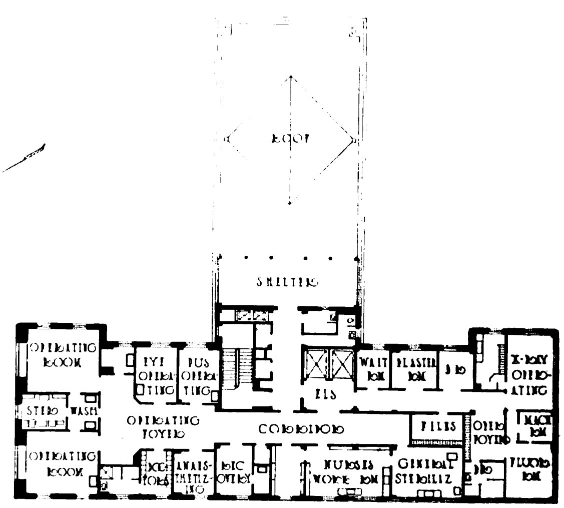
Illustrations on Plate 96

Type of construction. Fireproof
Exterior walls. Brick and limestone
Floors. Marble, tile, terrazzo, linoleum
Heating. Direct steam
Ventilation. Natural
Windows. Double-hung transom sash
Area of building. 66,000 sq. ft.
Cubage of building. 950,000 cu. ft.
Date of general contract. 1922
Cost of building proper. $700,000
Cost per cu. ft. 73⅔¢
Number of beds. 121
Cubic ft. per patient. 7,851
Cost of operating per day per bed. $4 (approximately)

This construction includes kitchen located in basement. Laundry and boiler room provided in other buildings.



TYPICAL FLOOR PLAN



SIXTH FLOOR PLAN

Essential Equipment for the General Hospital

By WILLIAM D. CROW, A.I.A.
Crow, Lewis & Wick, Architects, New York

IN the equipment of a hospital certain provisions must be made to afford a sufficient measure of safety to the patients and to provide for their comfort and, no less important, to make certain that the work of the nurses can be performed with a minimum of effort and time. Comparatively simple equipment will meet these requirements to a reasonable degree, and entirely adequate equipment need not run into great elaboration. It is advisable to make sure that unnecessary equipment is not installed, not only to save the first cost, but to avoid the maintenance cost and use of space which installation of such equipment would entail.

The Ward Unit. Each average ward of 24 beds should have a nurses' station, a chart room if possible, diet or serving kitchen, nurses' duty room or sink room, toilet and bath facilities for patients, and one or two quiet rooms for patients who must be removed from the wards for any reason. These adjuncts to the ward, in an economical plan, require a greater width than is necessary in the ward and should be grouped at the entrance end of a ward building. It is most convenient to place the duty room and patients' toilets nearest the ward, so that the traffic to them will not penetrate far into the central corridor and mix with other circulation.

As the dimensions of a building affording a good ward plan vary considerably from those of a building best suited for a private room plan, it is desirable when possible not to attempt to combine the two services in one building, although it is not possible often to so dissociate them. When this is the case some compromises must be made. Wards and semi-private rooms can be put in the same building without disadvantage, as the same dimensions of building and generally the same service arrangements are appropriate, excepting that an additional patients' toilet room will be required.

Nurses' Station. The station should have a position commanding a view of the ward and preferably be elevated a step to give a better view. The nurses' station should be outside of the ward so that the nurse can sit in a comfortable temperature when that in the ward is low during the night. The equipment should be a nurse's desk, enameled steel with drawers and with two side pedestals, one with grooves into which the chart boards can be slid and the other pedestal with shelves for dressings trays, set up ready for immediate use.

A cabinet is necessary at the nurses' station for medicines and routine supplies. The cabinets should be made deep enough to hold flasks and dressings and should have doors with locks. A sink under the cabinet is a convenience, but need not be provided. A lighting bracket above the nurse's desk or a receptacle for a portable desk lamp is necessary, and a pilot light of the signaling system should be placed directly before the nurse a little distance above the desk where it can be plainly seen. Outlets for exterior and interior telephones should be placed at the nurses' station. The chair should be comfortable and of wood; an enameled iron chair of an uncomfortable pattern is not necessary.

Signal Systems. While signaling can be done by systems of bells or annunciators or combinations of both, operated from push-buttons at the patients' beds, prevailing practice is to install one of the several good silent electric light systems now on the market. No system requiring current of above 10 volts should be installed because of the danger to the patient if he should accidentally receive a shock at a greater voltage from some defect in the push-button and flexible connector under his pillow.

In a usual installation, an outlet is provided on the wall at each bed location, from which a flexible cord conductor with push-button is run to the patient's bed. In wards or semi-private rooms it is desirable to have a small lamp on the signal circuit in each wall-set so that the point of origin of the call can be determined by the nurse when she enters the ward. The calling station, at the patient's bed, should have a push-button or other device, varying with different manufacturers, which is the only means of opening the signal circuit after the patient has sent in a call. This arrangement insures

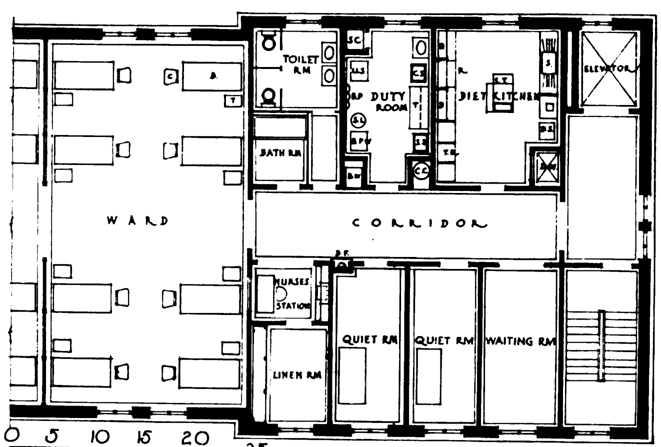


Fig. 1

WARD
B. Bed
T. Bedside table
C. Chair

DUTY ROOM
S. C. Specimen closet
U. S. Utensil sterilizer
B. P. Bedpans
S. L. Soiled linen bag
B. P. W. Bedpan warmer
C. S. Clinic sink
T. Marble table and shelf over
S. S. Slop sink
C. C. Clothes chute.

DIET KITCHEN
D. Dresser
R. Refrigerator
T. R. Tray racks
S. T. Steam table and gas plate
S. Sink
D. S. Dish sterilizer
D. W. Dumbwaiter

Nurses' Station, Evanston Hospital, Evanston, Ill.
Richard E. Schmidt, Garden & Martin, Architects

a visit of the nurse to the patient's bedside, all signals remaining lighted until this visit has been made. The resetting device should be of such a nature that it cannot be operated accidentally by a patient, thus canceling the call, nor should it be an arrangement which requires the nurse to use a key to open the circuit. A receptacle, on the full voltage lighting circuit, can be installed next to the signal outlet and under the same plate and will afford the current necessary for a hand lamp, table lamp or heating pad.

The calling stations described are wired so that the pressing of the extension push-button by the patient will light a lamp in the corridor over the door to the ward or room in which the call originates, and it will also light pilot lights at the nurses' station, duty room, diet kitchen and other places where the nurse may be expected to spend any time away from her station. The lighting of the pilot light directs the attention of the nurse to the fact that a call has been made, and by passing into the corridor she can determine the source of the call by the lighted signal over the door of the room or ward. In the case of divided wards, one unit of which is shown in Fig. 1, a signal lamp for each division, as well as a lamp over the entrance to the ward, aids the nurse in locating the call. Signal lights are made with buzzers attached, causing either momentary or continuous ringing, and these devices are useful under some circumstances where an audible call is needed, but, as the silence of a light signal system is one of its chief points of value, the buzzer attachments should be used sparingly. The light signal system can be equipped with an illuminated annunciator over the nurses' station for each floor, and, further, the signal systems of all floors can be connected to an illuminated annunciator in the main office. The addition of the annunciators at the station adds nothing to the value of the system and does add somewhat to the cost. The general annunciator in the office affords a check upon the promptness of the nurses in answering calls, but it involves a considerable additional expense in many cases, and would not be particularly valuable where the supervision is thorough.

Signal systems should be installed in conduits, just as a lighting installation is made. The 10-volt current is most readily obtained by passing the 110-volt lighting current through a "bell-ringing" transformer. There are several makes of these transformers for alternating current, and recently a trans-

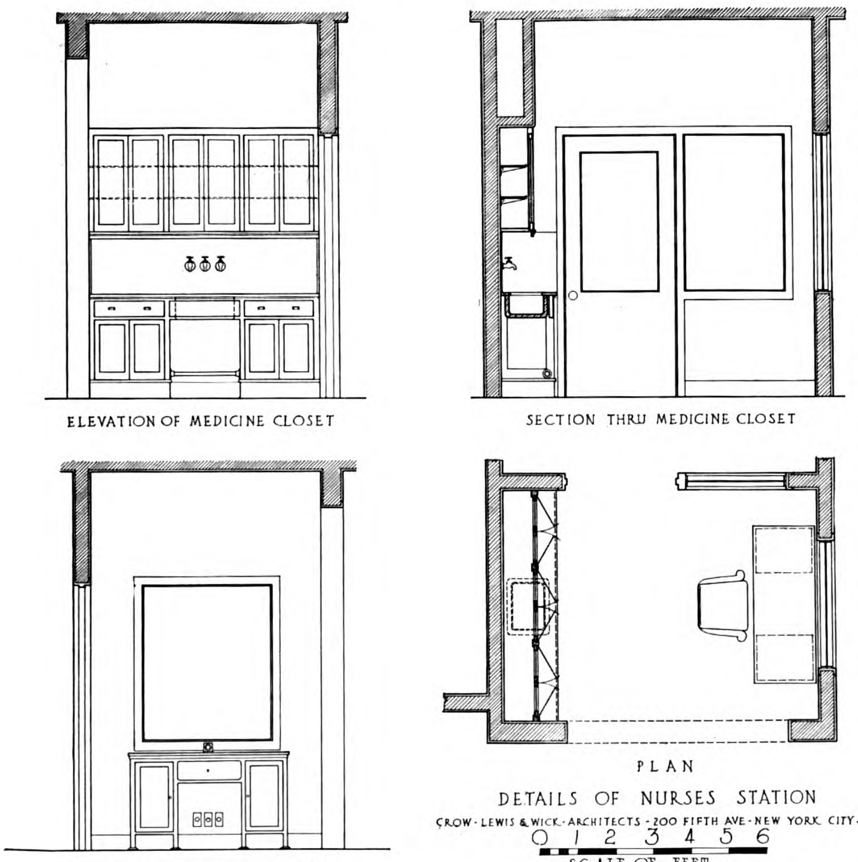


Fig. 2

former for direct current has been put on sale.

Operating Department. Movable operating room equipment varies and is often determined by the surgeons on the staff and the superintendent of nurses. Typical equipment for major and minor operating rooms is shown in the illustrations (Figs. 3, 4 and 5). To meet the requirements of the various surgeons a variety of equipment is necessary, and the selection should be left to the surgical staff.

Satisfactory equipment for a general major operating room is thus outlined: One instrument cabinet; one operating table; one stool for the surgeon and one for the anesthetist; one irrigator stand; one instrument stand; one solution basin stand, open ring at the top, cast base, mounted on casters; one anesthetist's set with ether apparatus and gas tanks, mounted on casters; one nurse's table, monel metal top, and shelf, size 20 x 48 inches, mounted on casters; one table, monel metal top and shelf, size 20 x 36 inches, mounted on casters; one drum stand, with two copper nickel-plated drums; one drum stand, with one copper nickel-plated drum, and one soiled dressing pail stand, cast base, open ring top, with steel porcelain pail.

The operating rooms should have lights providing for emergency light in the event of the failure of the electric current, such as the lights in the new Fifth Avenue Hospital operating rooms, these fixtures being fitted with eight electric bulbs and an auxiliary gas equipment, which affords a 300-c.p. gas light immediately, should the electric current be interrupted.

Equipment for a minor operating room may be made up in this way:

One operating table; one anesthetist's stool and one surgeon's stool; one anesthetist's set; one soiled dressing pail; one dressing table; one solution basin stand with a revolving top and with two solution basins, and one irrigator stand.

General operating rooms, intended to be used also by specialists, would have much the same equipment as the major operating room, excepting that the operating table should be selected to meet the particular needs of the eye, ear, nose and throat, the gynecology, the orthopedic and other specialists, but as the requirements as to equipment for the use of different specialists vary so widely, it is not possible to provide fully for them in a general operating room, and special rooms and equipment should be provided for special work if possible.

Cabinets. A considerable range of choice is possible in cabinets for various purposes in the equipment of a hospital. Varnished hardwood is the cheapest available material for cabinets and has the merit of standing hard usage for a long time without the necessity of refinishing. The appearance and characteristic construction of these cabinets would, however, restrict their use to duty rooms, diet kitchens and such other places as do not require strict asepsis or where appearance is not important.

Cabinets for dressings and instruments and the medicine cabinets at nurses' stations may be

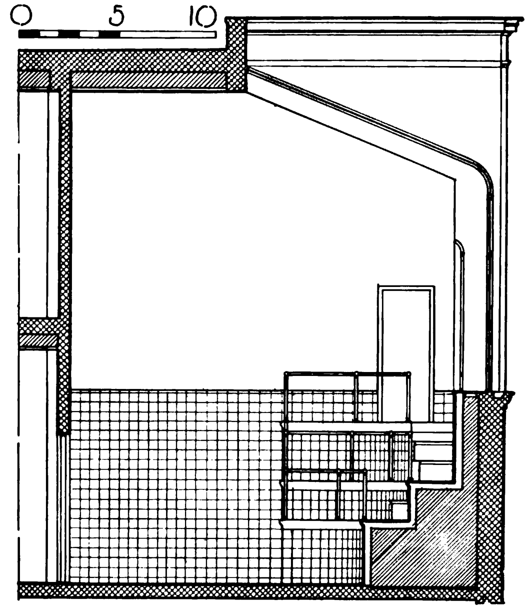


Fig. 3. Cross Section of Major Operating Room

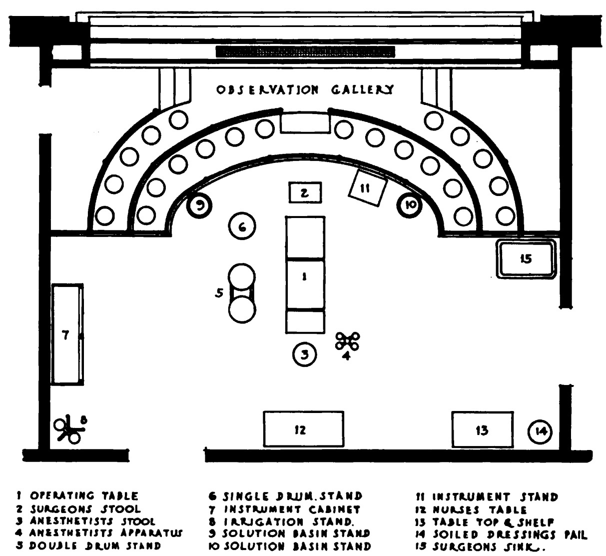


Fig. 4. Plan of Major Operating Room
Sloane Hospital for Women, New York

Crow, Lewis & Wick, Architects

enameled wood or enameled steel, preferably the latter, as the construction can then be lighter and of better appearance, and the cabinets can be more thoroughly sanitary. Heavy plate glass shelves, supported on adjustable nickel-plated brackets and having Carrara glass bottoms, improve the appearance of cabinets and are more easily cleaned than wood shelves.

Instrument cabinets in operating rooms should be enameled steel, with glass shelves and bottoms, and with drawers below for large instruments; they

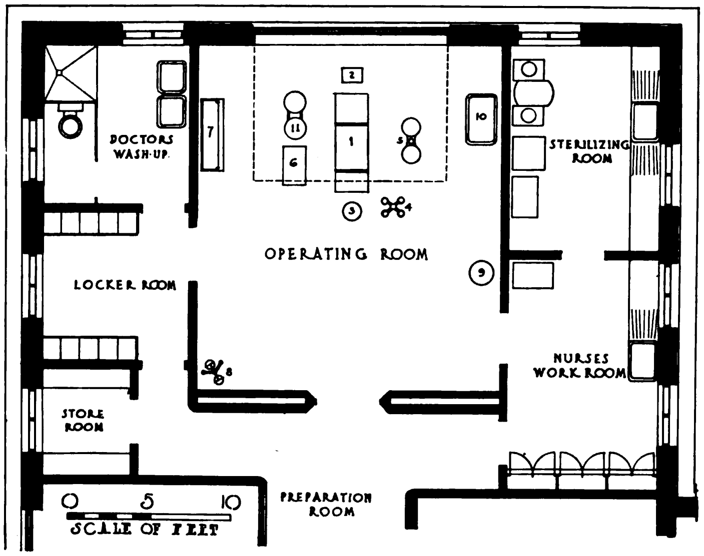


Fig. 5

1. Operating table
2. Surgeon's stool
3. Anesthetist's stool
4. Anesthetist's apparatus
5. Solution basin stand
6. Instrument stand
7. Instrument cabinet
8. Irrigation stand
9. Soiled dressings pail
10. Surgeon's sink
11. Drum stand

Plan of Minor Operating Room, Passaic General Hospital, Passaic, N. J.
Crow, Lewis & Wick, Architects

can be portable or built in with the fronts flush with the wall. Portable instrument cabinets have the advantage of being cheaper than built-in cabinets and of giving more latitude in the placing of the operating room equipment. Built-in cabinets undoubtedly contribute to the simplicity of the appearance of the operating room, but usually they involve a waste of space by reason of the thick partitions which must be built to contain the cabinets.

Blanket warmers should be placed at a convenient distance from any room occupied by patients, and very near each operating room. It is to be borne in mind that hot blankets are needed in emergencies, and that it should be possible to get them quickly. Portable enameled steel blanket warmers are made for steam, gas or electric heating. A steel-lined and insulated blanket closet can be built into the building when the plan will permit, and heated as described for the portable blanket warmers. If high pressure steam is available at all times, it affords the best method of heating the blanket warmers, if reduced to 35 to 40 pounds pressure, as it requires no attention of the nurses. Gas heating is less expensive than electric heating, but needs attention while the electrically-heated warmers do not, further than switching the current on or off.

Clothes Lockers. Private patients' clothes can best be kept in wardrobes in the rooms the patients occupy. A closet may be built in each room, but closets have the disadvantage of greater first cost than wardrobes and hamper the arrangement of furniture in a room, and the arrangement may have to be changed several times during the stay of a patient—at the request of the patient. Semi-private and ward patients' clothes can be kept in a locker in a room in each story, or a general locker room can be provided for the clothes of all these patients.

Having a receiving department, through which all ward patients must pass, is excellent practice. In this department the patient's street clothes are taken away, put through a disinfector and then placed in a locker in a nearby general locker room. The patient is bathed and dressed in hospital clothes before being taken beyond the receiving department. This is an excellent regimen as it minimizes the possibility of a new patient's carrying infection or vermin into the wards, which unfortunately has not been prevented under other forms of procedure. Lockers should be enameled steel with adequate ventilating openings. Lockers are made with mechanical ventilation for each group. In any case, the lockers should be placed in a dry and adequately heated and ventilated room.

Elevators. The necessity for safe and reliable elevator service is apparent in every hospital of over one story in height. In hospitals more than four stories high, or of more than 75-bed capacity, there should be at least two elevators to provide for emergencies requiring the moving of many patients quickly, and one elevator for use during breakdowns or repairs to other elevators. Elevators for passenger use are best grouped, to permit changing over in operation and to provide for a sudden heavy demand for elevator service.

The only type of elevator to be considered under the conditions usually encountered is the electrically-driven elevator. For motive power either direct current or polyphase alternating current affords satisfactory results. Where choice of both kinds of current can be made, the direct current elevator is preferable in view of the fact that direct current electrical apparatus is somewhat quieter in operation than apparatus operating on alternating current. Alternating current apparatus, however, does not fall short of the requirements of a hospital installation, for in the past few years notable improvements have been made in the use of this current, and satisfactory operation can now be obtained with it.

As it is essential that mechanical and electrical noises be minimized in every way possible, it is important that all precautions be taken to prevent the transmission of such noises as are always inherent to machinery in motion. The first step is to place the driving or hoisting machine at the basement or lowest floor of the building instead of locating it directly above the shaft, as is usual in other types of buildings. The machine should be placed on a sub-

stantial concrete foundation, and the foundation should be kept clear of all footings; in fact it is advantageous to surround the concrete block with sand instead of pouring the concrete flooring so that it connects thereto. The walls of the motor room should be, as far as possible, of such construction that they do not conduct sound. A sound-deadening partition with only a slot sufficient for the passage of the cables should be placed between the machine and the hatchway.

The minimum inside size of the elevator car to carry stretchers should be 5 feet wide by 7 feet deep, as this affords sufficient space for the stretcher and the attendant. As far as loading capacity is concerned, usually 2,000 pounds is sufficient and in fact generally in excess of actual requirements. However, in some localities there is prescribed a ratio between the car area and the loading capacity of the equipment, and where such laws exist they must be obeyed.

Car speeds can be proportioned to the length of travel. Usually 300 feet per minute may be considered the maximum speed that can be used profitably. For a five- or six-story building 200 feet per minute is sufficient. If a lower building is contemplated, speeds as low as 150 feet per minute or even 100 feet per minute are not impractical.

Two methods of car control are available. In most cases, especially where the elevators are separated or installed singly, the automatic type of elevator with push-button control is preferable as with this type of elevator any of the hospital attendants can call or dispatch the car. If it is desired to restrict the operation of the elevator to certain persons, key-operated push-buttons may be used at the landings, with keys placed in the hands of those whom it is desired to have operate the cars. Where elevators are operated continuously the standard manual control by means of a switch in the car should be provided. This type of operation is most desirable in tall buildings and where elevators are grouped together.

Recently a new device has been perfected for automatically bringing the car platform exactly on a level with the floor at a landing. This device is applicable to elevators of either push-button or switch control, and is particularly necessary in a hospital elevator where a landing an inch or so out of level causes discomfort to patients on stretchers or in wheel chairs. The leveling device has the merit of obviating "false flights"—jolting the car up and down at a floor in an effort to make a level landing, with the incidental waste of heavy starting current. The most suitable type of car is a plain paneled enameled steel car, with a practically entirely covered roof and with a plain thin band of stained and wax-finished hardwood at the height of the hubs of the stretcher wheels. This band takes most of the wear on the car and makes refinishing less often necessary.

Laundry Chutes. Soiled linen is customarily collected in canvas bags which are held in enameled iron bag holders until the bags are full and closed and then sent to the laundry. The bag holders are placed in the duty rooms. Infected linen requiring disinfection is handled separately and does not go into the laundry bags. While the bags can be taken down on the elevator, it is a great convenience to have a clothes chute into which the bags can be dropped to the basement, from where they are taken to the laundry. Under this practice no contamination of the clothes chute takes place, and there is no necessity of supplying special means of cleaning the chute.

The clothes chutes should be of light plate iron with all joints butted and all rivets countersunk so that the interior of the chute will be smooth and not have roughnesses to wear or tear the bags. The diameter of the chutes should be about 2 inches greater than the diameter of the filled bags. The chutes will vary from 18 to 26 inches in diameter.

At each story there will be required a door 30 inches high and the width of the diameter of the chute. These doors require angle-iron frames and the doors should be plate iron with spring hinges, latches and light checks to keep the doors from closing noisily. A plate iron collar should be provided from the frame of the door into the chute, the bottom sloping 45° to carry the bag into the vertical chute.

A certain amount of vacuum is created by the passage of the bags down the chute, and while the clearance around the bags, recommended before, will reduce the vacuum, it is advisable to take the further precaution of providing an air inlet, about 8 inches square, with a wire screen, in the top of the chute, and to proportion the thickness of the plates used in the construction of the chute and doors to the height of the building, a tall building requiring the use of heavier metal than a low building. Means for arresting the momentum of the falling bags is necessary at the bottom of the chute.

A considerable number of hospitals have installed a special clothes chute made of sections of cast iron, lined on the inside with a glass enamel and provided with a flushing device at the top of the chute and a drain at the bottom. These chutes have heavy circular doors. The use of sheet iron lined wooden chutes should be avoided.

Dumbwaiters. Where the dumbwaiter travel is not of more than two, or at most three, stories, and where the service is light, hand-operated dumbwaiters are practicable. These installations should have efficient brakes to hold the car at a landing, and the gearing should be practically noiseless. The size of the car should be about 2 feet by 3 feet and 4 feet high, with one hinged shelf. The car can be hardwood or steel.

Where the service is greater than that described for a hand-power lift, automatic electric dumbwaiters should be installed. These are practically miniature automatic elevators and operate similarly, excepting that the banks of operating buttons are placed outside of the shafts. Carrying capacity

of the dumbwaiter should be determined by the actual load to be carried.

Vacuum Cleaning Systems. As cleaning with soap and water is necessary in any event, a vacuum cleaning system in a hospital can be looked upon simply as a valuable adjunct for cleaning rugs, mattresses, upholstery and such other material as cannot be washed. A central plant, piped to from outlets throughout the building, gives the most perfect results, but at a considerable cost of installation. An alternative is to place receptacles for electrically-driven portable vacuum cleaners.

Sterilizing Equipment. Since the modern methods of sterilization are practically standardized and are accomplished more or less satisfactorily in the general type offered, the hospital's selection should be largely on the basis of utility and maintenance. It should be kept in mind that of all the equipment in the hospital, possibly without exception, the sterilizers are subject to most neglect and abuse. This abuse is not willful, of course, but, because of the constantly changing personnel and the lack of the mechanical experience needed, competent operation of these fixtures can hardly be expected.

A careful inspection of design, construction and materials usually reveals the merits of a sterilizer. There are more valves and fittings required for the operation of the sterilizers in an average hospital than for any other fixtures or groups of fixtures outside of the power plant. For the complete steam-heated sterilizer equipment of a medium capacity general hospital, say of about 100 beds, there are approximately 150 valves—all potential points of trouble—all subject to unusual performance, and entirely outside of the immediate supervision of the engineer's department.

The selection of the method of heating the sterilizers is naturally governed by local conditions and a consideration of economy. Medium pressure steam (of not less than 35, preferably 50 pounds at the fixture), electricity and gas have had practical demonstrations sufficient to be considered as standard methods. When steam pressure is available at all times, this provides the logical method, but if it is necessary to maintain a high pressure boiler plant especially for the operation of the sterilizers, it is frequently found that electricity or gas will be considerably more economical. A combination of steam and electricity or gas is sometimes desirable, especially for instrument sterilizers, providing for the use of the substitute when pressure is not available.

The electric method has many advantages over the gas, and can be used frequently to advantage in sections enjoying a low rate per kw. Unfortunately, however, heating by electricity involves a prejudice not altogether justified. It should be considered that the successful operation by either of the two methods involves, to a great extent, the human element. The same neglect that causes an electric heater to burn out will also cause even greater damage to a sterilizer heated by gas—burning dry. The cost of repairs is usually less in an electric fixture than in a gas-heated fixture, for the reason that the damage is localized, in the one case being confined to the replacement of a heater, whereas the damage caused to a gas-heated fixture may mean extensive repairs.

Typical sterilizing equipment required in an average 100-bed general hospital is thus planned:

General Sterilizing Room.
- 2 dressing sterilizers 16″ x 36″, with automatic control valves.
- 16 drums.
- 1 3-drum stand for each operating room.
- 1 pair of water sterilizers, 50-gallon capacity each tank, with automatic control valves and with 6-gallon capacity distilled water attachment.
- Instrument sterilizers, 9″ x 12″ x 22″ (one for each operating room).
- Utensil sterilizers, 20″ x 20″ x 24″, mechanical lift (one for each operating room).
- 1 saline solution sterilizer.
- 1 blanket warmer, 20″ x 24″ x 72″.

Maternity Department Sterilizing Room.
- 1 pair of water sterilizers, 10-gallon capacity each tank.
- 1 utensil sterilizer, 20″ x 20″ x 24″.

Dressings Rooms.
- 1 pair of water sterilizers, 6-gallon capacity each tank.
- 1 instrument sterilizer, electric, 5″ x 6″ x 16″.

Duty Rooms.
- 1 utensil sterilizer, 20″ x 20″ x 24″, mechanical lift (one for each ward).
- 1 instrument sterilizer, electric, 5″ x 6″ x 16″ } one for each ward.
- 1 blanket and bedpan warmer, 20″ x 24″ x 72″ } one for each ward.

Locker Room and Mattress Storage Room (convenient to both).
- 1 mattress and clothing sterilizer, 36″ in diameter by 88″ long, steam and formaldehyde—dry heat.

Incinerators. Disposal of waste may be made by burning it in local incinerators placed throughout the building, by burning the waste in one incinerator placed in a special room in the basement, or by disposing of all waste, including that from the kitchen, in one large incinerator outside of the building and preferably connected to a large chimney, such as the chimney of a power house, if this arrangement can be made. Local incinerators are not entirely free from objectionable features, such as a considerable consumption of fuel, the occasional escape of odors, and the need of repairs from time to time, especially if much wet waste is burned. The disposal of waste in one incinerator within the building overcomes some of the objections to the use of local incinerators, but if all the waste of an average sized hospital is to be disposed of in this one incinerator it is likely to be inconveniently large and there may be difficulty in providing an adequate flue for it.

General incinerators, outside of the building, can be built of masonry with firebrick linings and double grates, also of firebricks. In incinerators of this type practically no fuel is required, excepting for starting the operation of the incinerators, as the waste is dried on the upper grate and falls through to the lower grate, where it is consumed. The construction of these incinerators, being all masonry, is not destroyed by the distillates from the waste, even from very wet kitchen waste, and repairs are not often necessary. It is sometimes expedient to provide one moderate sized incinerator within the hospital in which to burn dressings, and to dispose of all other waste in the general destructor outside.

Hospital Finish and Decoration

By WM. B. STRATTON, F.A.I.A.
Stratton & Snyder, Architects, Detroit

HOSPITAL authorities are calling for the use of color. It will not do to wait the usual year for the appearance of "cracks" in walls. This item of color should get into the original contract, and in order to insure this the architect should specify and describe in general terms the colors for the interior of the hospital. It is not sufficient that he should specify "so many coats, applied according to the directions on the can."

British Military Nurse, Gibraltar

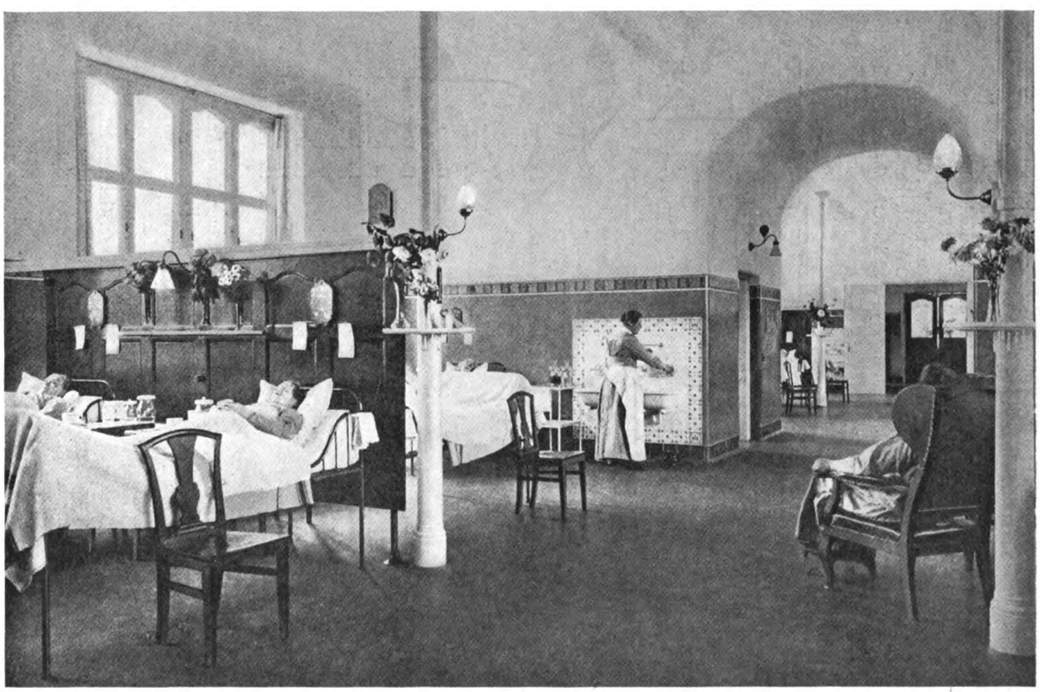
Hat and Dress, White; Cape, Warm Gray; Shoulder Cape, Red Broadcloth

Color is a constantly active agent in the comfort of the patient. It adds to the welcome of the doctor and the nurse, and is ready at the first response of the patient to his surroundings to aid in a positive way towards recovery. It eases the shock of the transfer from home surroundings, and helps to eliminate fear from the mind. The architect should take every advantage of present knowledge in securing every possible interest for his color, and his specifications should be broad enough to call for richness in materials and variation in the manner of application.

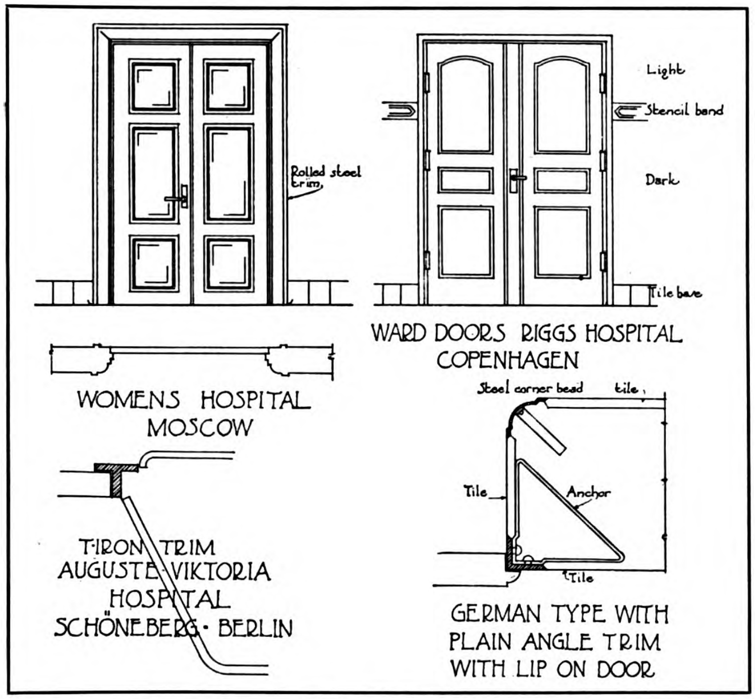
The specifications should provide that the neutral shades should be reached through the use of strong colors and that there may be an opportunity to place contrasting colors in the different coats. After these items are securely placed in the specification and contract, the architect should use every means to get the most expert assistance to the end that at each point the utmost advantage may be taken of the natural lighting. Luckiesh gives five theories of vision. He winds up by saying, "Needless to say, however, there are those who entertain a different opinion on this last and other points." And so, while we are left in doubt as to the reasons for our feeling color, there is no doubt that we are greatly affected, for either bad or good, by the color in our surroundings, and that every means should be taken to see that these effects should be good.

The effective value of colors, given by N. A. Wells from extensive experiment, is thus summed up:

Exciting—from scarlet to yellow.
Tranquilizing—yellow-green to violet-blue.
Subduing—blue to purple.



Interior of Ward in Rigs Hospital, Copenhagen, Showing the Division into Alcoves by Screens

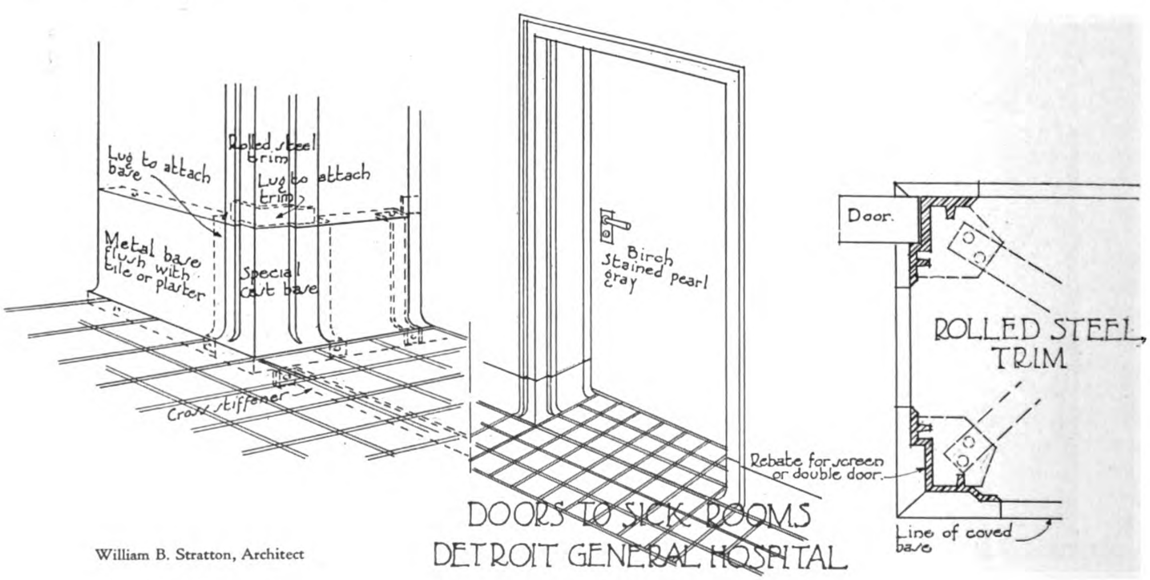


Details of Door and Corridor Finish in European Hospitals

Strong colors should be used in small areas, and tints and shades in large areas. The effective amount of color is determined by the solid angle subtended by the colored object, so that as our room walls come close to the eye, a comparatively small area equals the effect of the distant countryside and should be subdued accordingly. Color values should be used in combination, as they naturally appear at their most intense points in shading from white to black; that is, dark yellow should not be placed in combination with a light red to cite an example.

Besides the use of pigments, many restful effects can be obtained through the simple use of materials. Simple effects in woodwork and tile can be so handled as to be of restful influence. Points of interest in public rooms and halls call for moderate elaboration of decoration. The walls of corridors and points subject to much use or likely to be spattered should be of a different color or material, with limits plainly defined in order that the necessary cleaning may be limited to the portions affected. For this reason it is well to have an area of tile back of fixtures.

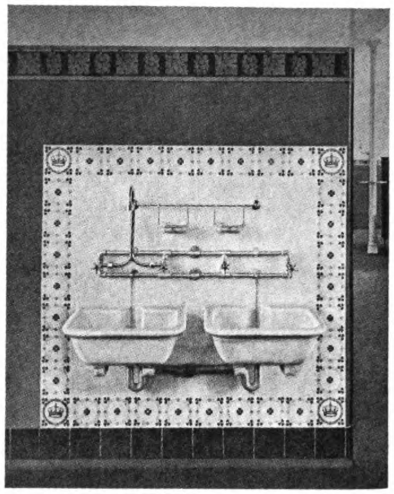
Simplicity and ease of cleaning are the essential points in hospital trim. The avoidance of mouldings and of angular features should be sought. There is a difference in regard to trim between the home and the hospital. In the home it is allowable to look for considerable architectural effect in the trim of doors and windows, while in the hospital simplicity should rule and the homelike effects be obtained by other methods. The various roundings of corners and angles so desired can be obtained by the use of metal or tile, but where economy demands it there seems to be no great objection to the use of plain band casings. Tile comes under consideration as a color vehicle, for desirable light reflection and for wearing qualities. In the operating room tile is valuable for conserving and concentrating the light admitted, and for this purpose the upper parts of



William B. Stratton, Architect

the walls and ceilings should be light and highly glazed. The lower parts of the walls and the floors should be dull, the floors of a light neutral, and the wainscots of a darker grayish green to act as a relief from the eyestrain of the surgeon.

For general decoration in the waiting rooms, halls and wards, tile furnishes the most excellent permanent material, and responds most wonderfully to the skill of the designer. In fountains and other such adjuncts tile gives back the values of light in the most satisfying manner. For the rough, hard usage of the service portions, tile is the most permanent and satisfactory material. The report of the Flooring Committee of the American Hospital Association gives to the architect a most valuable suggestion of the manner of approaching the floor problem, and gives also a complete description of the qualities recommended for different purposes, even to giving the trade names. After determining the desirable points in relation to use, permanency and comfort, he can here find the result of experience in regard to materials thus far furnished. It would seem, in general, that heavy service requires use of tile or dust-proofed concrete, that thoroughfares should have a field of material of a soft type laid between coved bases of tile or terrazzo, and that floors of the rooms may be of any type that is easily cared for. The comfort of the patient and nurse comes before permanency.



Decorative Tile behind Lavatories in Rigs Hospital, Copenhagen

The door opening and rabbet should be of materials to conform to the general type of simplicity and permanency determined upon. To this may be added the requirement that they should hold their places while resisting the shock of the door. These qualities are perhaps best found in the rolled steel section. Perfectly satisfactory types are also made in heavy drawn metal. Efforts to use a wooden trim and get the same flush qualities between the wood and the plaster do not seem to have been successful, and where wood is used it is well to install a simple band casing. The doorleaf itself should be extremely simple. Where dampness is expected, doors may be of metal.

In thinking of the type of window it may be well to consider the most desirable features of a hospital. A. Saxon Snell, in speaking of the lessons taught by the war, places of first importance fresh air in abundance and the removal of foul emanations from the neighborhood of the sick. The Committee of Buildings, A. H. A., shows that the tendency is toward the use of the double-hung sash. There are many improvements in the double-hung sash, tending to give 100 per cent, well controlled ventilation and means of cleaning. In some types the sash screens slide entirely out of the opening, and in others the sash are pivoted and tipped in various ways. Many people, however, differ, and feel that the casement is the simplest and quickest means of getting the fullest ventilation and is the type most likely to be used regularly. The double casement with easily operated transom would seem to give every means for quick change of air, and while the most perfect circulation of conditioned air may be obtained through the use of modern apparatus, there still seems to be the need of periodic surrounding of the patient with fresh, sun-cured, outside air.

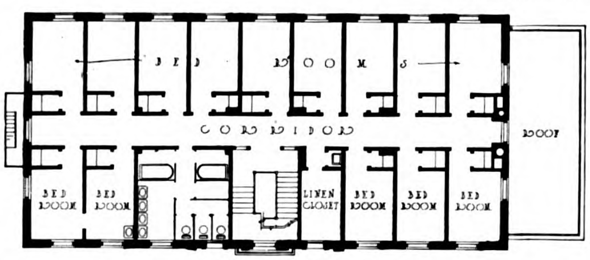
In regard to furnishing and decoration, there is a tendency to use cheerful hangings, rugs and furniture, and many items that tend to take the mind of the patient from his unfortunate condition.

A Modern Private Room Treatment, Evanston Hospital
Richard E. Schmidt, Garden & Martin, Architects

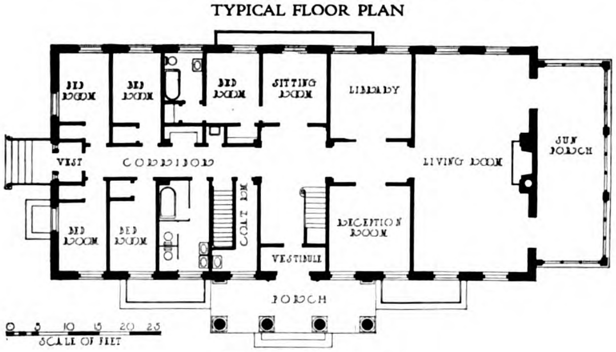
Nurses' Home of Hackensack Hospital, Hackensack, N. J.

CROW, LEWIS & WICK, ARCHITECTS

GENERAL EXTERIOR VIEW



TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

THIS illustration and floor plans are of the nurses' home of the recently completed Hackensack Hospital which is illustrated on Plate 96. Every possible provision has been made to give the home the atmosphere of a private dwelling, and with but a few exceptions the nurses are provided with individual rooms. Designed to agree in appearance and general character with the hospital building proper and of fireproof construction, the exterior walls of the nurses' home are of brick trimmed with limestone, and the roofs are of slate. Windows are of the double-hung type. Floors are generally of terrazzo and in certain of the rooms are covered with linoleum. Within this building are a small laundry for the use of the nurses, the kitchen for the nurses' home, a teaching diet kitchen, and the heating plant.

The cost of the building, which was built in 1916, was $125,000 without equipment, while the cubage is 150,000 cubic feet, or about 4,286 cubic feet for each of the 35 nurses whom the home accommodates, and the cost of the structure per cu. ft. was about 83 1-3 cents.

Prevention of Sound Travel in Hospitals

By CHARLES BUTLER, F.A.I.A.
Butler & Rodman, Architects, New York

THE problem of controlling and reducing noise in the hospital divides itself naturally into two parts: the reduction of the amount of noise generated, and the prevention of travel through the hospital of the noise which must exist. The former is a question of construction, while the latter problem may in general best be solved by careful planning.

It must be admitted that all the tendencies of modern construction are toward the use of materials which are noisy; our patent plaster is harder than the old fashioned lime plaster, our materials for floors and partitions are harder than those used in the past, and with the complete elimination of curtains and other hangings the average hospital room has reached the acme of noisiness. This condition may, however, be much improved by the use of old fashioned lime mortar on walls and ceilings, by covering the floors with linoleum or cork or the rubber flooring now coming into use, by the use of curtains of washable materials, and in private rooms by the use of rugs.

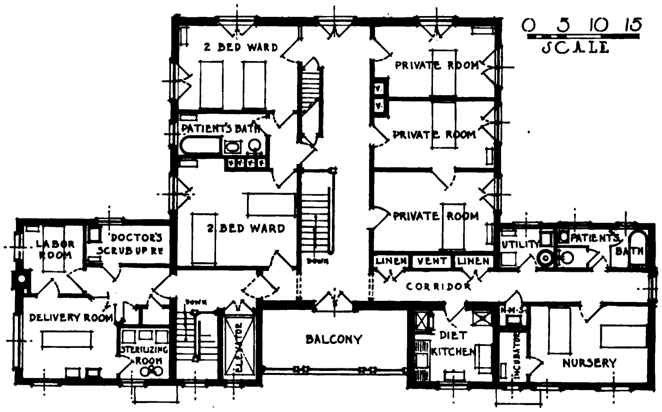
What is known as acoustic felt deafening may be employed with advantage on ceilings and even on the upper parts of walls where they are not likely to be damaged. Its cost is by no means prohibitive, while its value in such rooms as nurseries, delivery rooms, kitchens and utility rooms can hardly be exaggerated. A similar treatment of corridor ceilings has proved most efficacious in toning down these long tunnels which reverberate with the inevitable noise caused by the passing of food trucks, the conversation of visitors and staff, and the hurry of feet. Excepting where the traffic is heaviest, corridor floors may also be covered with the soft type of floor finishes, cork, rubber or linoleum.

It seems needless to insist that no door in a hospital should be allowed to slam; this means that every door fitting into a rabbeted jamb must be provided with a door check. The snapping of the latch when the door closes may also be a source of considerable annoyance to a nervous patient, and this may be obviated by the use of a turn button to hold the latch back when desired, while rubber strips and bumpers set in the rabbets of doors may also be used to advantage. Doors to utility rooms and diet kitchens, which are constantly opened and shut, should be of the double-swinging type, and here it is well to spend the money required for the better type of floor pivot hinge.

Care should be taken in the details of elevator doors to prevent the jarring and noise caused by their being opened and shut. The two-speed, three-panel type of elevator door, so commonly used, is most satisfactory for hospital work in that it furnishes a relatively large opening, but it is exceedingly difficult to avoid noise in its operation. The use of the folding accordion type of door hung on ball-bearing pivoted hangers is well worth considering in this connection.

While the architect can, by the study of details and the use of suitable materials, greatly reduce the amount of sound transmitted, there are certain problems which can best be met by well considered arrangements of plan. It is evident that certain rooms in every hospital, such as kitchen, laundry, diet kitchens, utility rooms, delivery room and nursery, must from their very nature be sources of noise, and these should be as far as possible removed from wards and private rooms. In the case of the first two, this may best be accomplished by placing them on the first floor, in an extension or in a separate building, but in the case of serving pantries or diet kitchens and utility rooms, especially the latter, this is manifestly impossible. The utility room must be in close proximity to the ward, and then the only help lies in keeping the door always closed. The diet kitchen, on the other hand, may be placed a little farther away with nurses' room, day room or bathroom as a buffer between it and the ward. The problem of the location of these rooms is complicated by the tendency of the day toward increase in the number of so-called "quiet rooms" in connection with the ward units. These must be near to both utility rooms and nurses' offices and not far from the diet kitchens; needless to say, it is difficult to fulfill these requirements and still secure the quiet desired.

The location of delivery room, labor room and nursery in a maternity hospital is one requiring especially careful study. It would seem obvious that they should be well separated from patients' rooms, yet the writer saw recently the plans for a proposed maternity hospital where the delivery room was



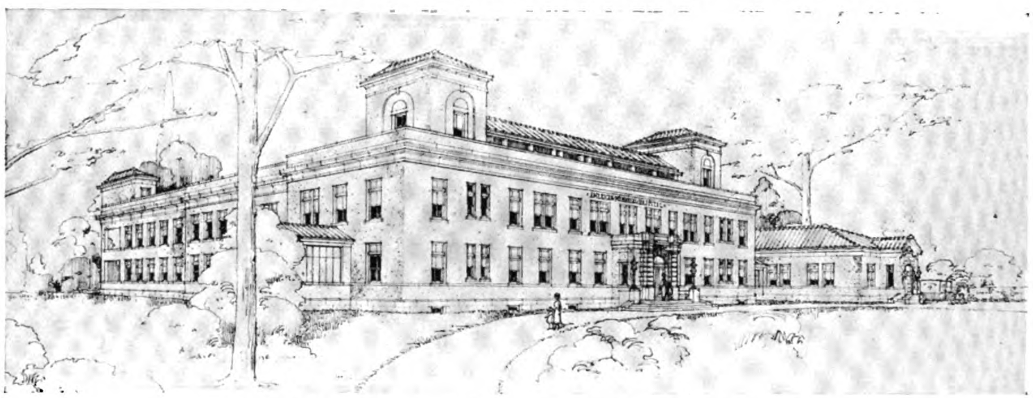
Plan of Remodeled Dwelling for Maternity Hospital Showing Distribution of Rooms to Control Noise. Butler & Rodman, Architects

directly across the hall from a row of private rooms. The most desirable arrangement appears to be that by which the delivery room with its sterilizing room and similar services is placed in a separate wing. If this is not possible, the section of corridor giving access to it should be cut off by doors, and only service rooms so placed as to have access to this section of corridor. The nursery should also be cut off from the patients' rooms, so that the crying of the babies will not disturb the mothers, and it may well be grouped with the delivery room.

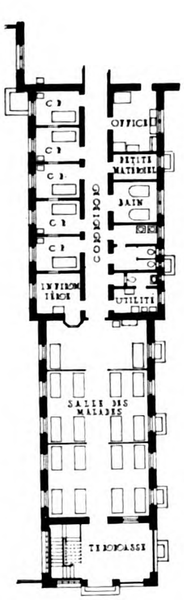
The writer had occasion recently to remodel a dwelling for use as the maternity department of a general hospital, and the plan of the upper floor of this building is given as an example of good distribution of rooms in this type of hospital, from the point of view of control of noise. It will be noted that one of the wings contains the delivery room, sterilizing room and labor room, and that the window of the labor room is on the side away from the patients' rooms, while the other wing contains the diet kitchen, utility room and nursery, the latter being on the side away from the patients. As the building in its original form contained all the space elements of final plan, the architect can claim only the credit of knowing a good thing when he saw it.

American Memorial Hospital, Reims, France

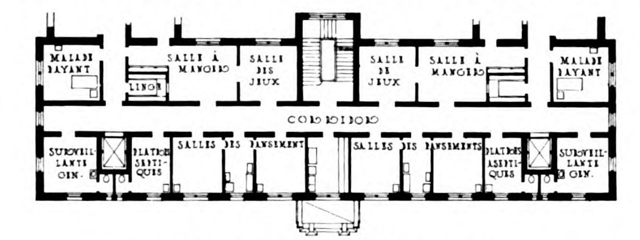
BUTLER & RODMAN AND AUGUSTE PELLECHET, ASSOCIATE ARCHITECTS



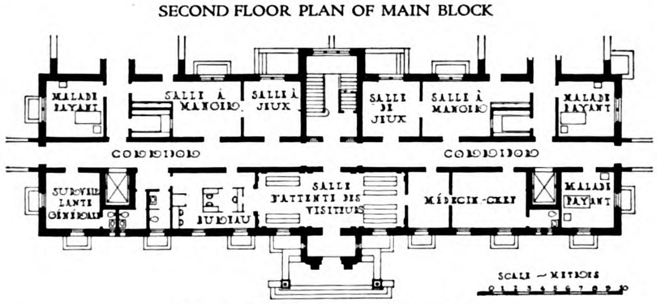
THIS building is a gift to Reims by the American Fund for French Wounded, and is to constitute the children's service department of the general hospital, although the plans permit its being operated temporarily as an individual unit. Construction is brick with stone base and cornices and stuccoed walls; floors, concrete. It has 110 beds.



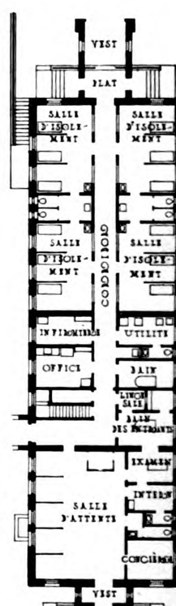
TYPICAL FLOOR PLAN OF WARD WINGS



SECOND FLOOR PLAN OF MAIN BLOCK



FIRST FLOOR PLAN OF MAIN BLOCK



FLOOR PLAN OF ADMITTING PAVILION

Hospital Heating and Ventilating

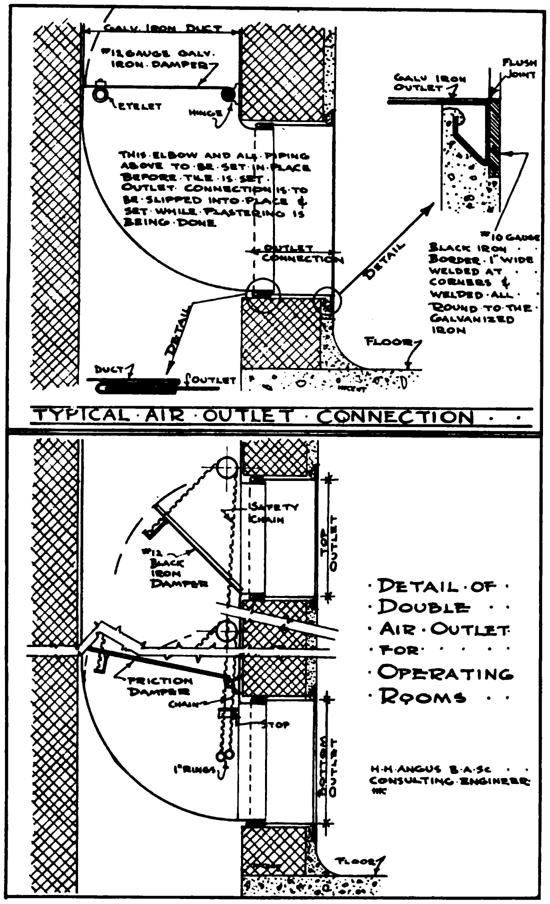
By HARRY H. ANGUS, B.A.Sc.
Consulting Engineer, Toronto. Member A.S.M.E. and A.H.V.E.

THE requirements for heating and steam in a hospital are similar in a general way to the requirements of other institutions, but they differ in that in a hospital high pressure steam is required every day in the year and 24 hours per day. This must be borne in mind in designing the power plant and steam layout, and there must be sufficient reserve so that in case of breakdown of any unit in the power house, the supply of steam and heat will not be shut off even temporarily from the hospital. The question of ventilation comes in mostly in connection with patients' rooms, kitchens and toilets, and is not of great importance for the nurses' home, help's quarters, etc., which are ventilated by opening the windows in the same way as the average residence.

There are many ways of installing heating and ventilating systems for hospitals, but they can all be divided into two general divisions, that is, systems in which the heating and ventilating systems are combined, and those in which they may be operated separately. In the former, heating and ventilating are accomplished generally by air taken from outside and heated and then forced into the rooms. This system is difficult to adjust as, generally speaking, all the air is heated in one place and is the same for all parts of the hospital, so that rooms which require the most heat must necessarily receive the most air and the greatest ventilation, even though the ventilation of these rooms may be of no importance. Also, when the wind changes direction, the amount of air going to the different rooms must be varied in order to give a uniform temperature to all rooms. This is difficult to do, and for this reason as well as because of the high cost of operating such systems, they are not favored for hospitals.

The second system is that in general use and involves the use of direct radiation in the rooms. The ventilation may be secured by drawing in the air from outside and purifying it, and then blowing it through a series of ducts to the various rooms, after being brought to room temperature by passing over coil heaters, or by placing an opening in an exterior wall or using a window and allowing fresh air to pass into the room unheated, or else by passing it over a radiator on the way in. In either of these cases it is necessary to remove the foul air from the room, and this may be done by gravity, an aspirating coil, or an exhaust fan. By installing temperature control on the radiators and an air washer and temperature and humidity control on the fresh air supply system, there is no doubt that uniform conditions may be obtained in the hospital. Where special cases are being treated, which require constant temperature and humidity, this system is most desirable. In general, however, medical men do not agree that constant temperature and humidity are necessary or desirable. In view of this, the natural, open window type of ventilation can be used. Of course where the outside air is filled with smoke or dust or other impurities, there is no doubt that the air should be washed and treated before being delivered to the rooms. This system is fairly expensive to install and operate and depends on fans and other mechanical appliances. Unless these are kept in running order and the operating engineer given strict orders regarding the running of the system, it will probably fall into disuse and the ducts become covered with dust inside. Like every other mechanical contrivance it requires intelligent operation for successful results. For general use, it will probably be found that the most convenient method of securing fresh air is to open the window or else place an opening at the back of the radiator leading outside. By using a draft strip or some method of preventing drafts it would appear that opening the window is the simplest and most sanitary means of getting air into the room.

The air from the room should be exhausted from a point near the floor and across the room from the entrance of the fresh air. This air is exhausted into a galvanized iron flue which is carried up to the attic or roof where it is connected with other ducts to form a trunk duct which is connected to the outside air. The opening into the room should be left without a grille and arranged so that it can be easily cleaned. An adjustable damper should be located in this exhaust flue which can be adjusted by the engineer in charge and yet be out of view of the patient. This damper may be adjusted to give the correct amount of exhaust ventilation for the room. Sometimes the vertical ducts are built up of tile, but it is difficult to get a tight job and galvanized iron ducts cost very little more, are much more sanitary, and save space on account of the thin walls as compared with tile. The amount of air exhausted from a room of course controls the amount of fresh air which will come in. The ducts may be so proportioned that in cold, clear weather there will be sufficient air exhausted from the building by gravity, but during mild weather of spring and fall, there must be either a fan or an aspirating coil placed in the main duct to produce sufficient flow of air. On account of the difficulty in getting operators to start and stop fans as required, it is usually better to depend on an aspirating coil which may be valved so that only a portion may be used at one time. These coils require practically no attention, and it is much easier to get the average attendant to use them than to start the fan at stated intervals. The fans could be wired so as to be started and stopped from a convenient point in the basement, but if this be done there is a tendency on the part of the operator to neglect the fans and motors.



Details of Duct Outlets

Special ventilation is required for kitchens, laundry, laboratories and operating rooms. In these rooms it is advisable to connect the exhaust flues to fans and provide a by-pass around the fan for gravity ventilation. The operating and sterilizing rooms should have a fan for themselves, and this should have its control switch located on the operating floor in a convenient location. The fresh air for these rooms may be brought in by a fan and heater which will supply fresh warm air, or it may be brought in through the wall and over a radiator. In the operating rooms a glass screen is generally placed in front of the radiator, with openings to the room at top and bottom so that the patient is protected from drafts and the air inside the room circulates around the radiator. Vent outlets from operating rooms should have top and bottom openings into the room so that the air may be exhausted from the floor or ceiling. In the case of the kitchens, an exhaust fan and duct system only is required, as the fresh air will come from windows or the surrounding corridors. Diet kitchens and main kitchen may all be connected up to one duct system and one fan. By maintaining a slight vacuum in the kitchens, there is no danger of odors from this department spreading around the rest of the building.

The usual arrangement in kitchens is to place hoods over the equipment and exhaust all air from the rooms through them. A much neater and more sanitary arrangement consists in providing individual vents from the cooking apparatus. These are extended down to the floor and connected underneath to a main vent duct, the end of which exhausts to the atmosphere by gravity. The large amount of cooling surface of the main duct will condense most of the vapors, and the condensation can be drained off to the grease pit. The smoke connection from the range may also be carried down through the floor. The exhaust ducts may be from the walls of the room. This arrangement does away with all hoods over the apparatus, which are very difficult to keep clean.

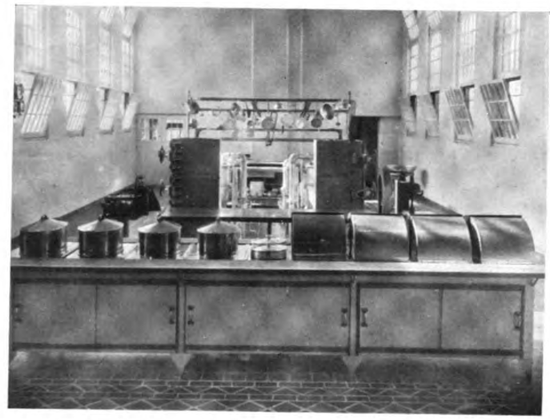
Hospitals, like other buildings, are usually heated by direct radiators around the outside walls, and these may be supplied with either steam or hot water. If steam is used, it is advisable to use a two-pipe system with a modulating valve on the supply and a thermostatic trap on the return of every radiator. This does away with air valves such as are used on ordinary gravity systems. With the trap system, best results are secured by using hot water type radiators and supplying steam at the top. On large systems vacuum pumps are usually placed on the main returns to pull back the condensation, but on small buildings pumps are not necessary and air eliminators may be used. The trap system will give good results and is better than the one- or two-pipe gravity system. Automatic temperature control is very seldom used in hospital work as it is expensive to install, and doctors claim that absolutely uniform temperature for patients is not desirable. If hot water heating is used it should be a forced system. Slightly more radiation is required (about 10 per cent), but the pipes need not be larger than for steam, and the necessity for traps is removed so that from a cost standpoint there is but little difference between vacuum steam and forced hot water. Hot water seems to be better suited for hospital work than steam, as it is possible to vary the temperature of the water in the power house so that the rooms may be kept comfortable whether the outside temperature is high or low, without touching the radiator valves. Hot water also gives a uniform heat regardless of slight changes in the firing of the boilers. The radiators being not so hot as with steam, there is less danger from injury to patients. Hot water also works out more cheaply from an operating standpoint than steam. Bathrooms, operating rooms, creches, nurses' stations and similar rooms should be kept considerably warmer than the patients' rooms. On the other hand, kitchens, laundries and sterilizing rooms require only sufficient heat to keep them at about 50° when the apparatus is not working. Radiators should be of the plain pattern hospital type, 3½ inches center to center of sections. It is advisable to keep them at least 2½ inches clear of the nearest walls. They should also be supported so that all parts are accessible for

cleaning. This is often done by supporting the radiators on brackets from the walls. Where tile lining is used in walls, however, it is difficult to properly secure these brackets. To overcome this, the writer has used a center leg radiator which stands on the floor and a small brace is run from the radiator to the wall. The cut shows this radiator, which allows ample space for cleaning all around. Hospital radiators should have legs at least 6 inches high.

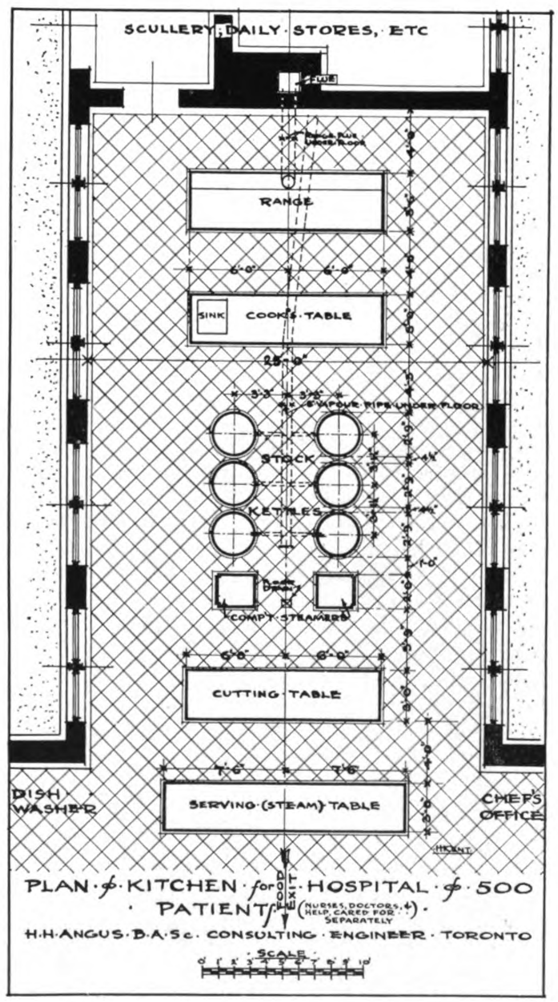
In addition to the general heating system, which should be arranged so that it may be shut off in sections for repairs, provision must be made for heating the operating rooms during periods when heat is shut off from the rest of the building. The radiators in these rooms are usually heated by steam and placed on a separate pipe circuit controlled from the boiler house. It is thus possible to secure heat in the operating suite on a cool day in summer, and at other times during the year the use of steam radiators allows these rooms to be heated up quickly. In these rooms there should be ample radiation. It is also advisable to use steam on the aspirating coils as these will be in most demand during spring and fall when the temperature of the water for the heating season would be comparatively low.

The location of the power house should be carefully chosen with the view of placing it as close as possible to that part of the hospital which requires the most heat. It should also be located so that coal and other supplies may be easily and cheaply delivered. There are of course many other matters which influence a correct location, and these should all be gone into carefully. Ample provision should be made for the extension of the power house and its equipment. Where the hospital consists of a number of scattered buildings, it is advisable to run tunnels underground from the power house to these buildings and to carry the pipes in these tunnels. If these tunnels are made large enough, the pipes are under view at all times and leaks can be repaired before they become serious. Where buildings are separated at considerable distances, the cost of tunnels is sometimes prohibitive, and in that case the pipes can be run in tile conduits of which there are several makes on the market. It must be remembered, however, that pipes which are run underground are hard to inspect and they may be in bad shape before leaks are found. The life of pipes in underground conduit depends to a great extent on soil conditions, and in some cases pipes will rust out in 4 or 5 years and in other cases they may last 20 years.

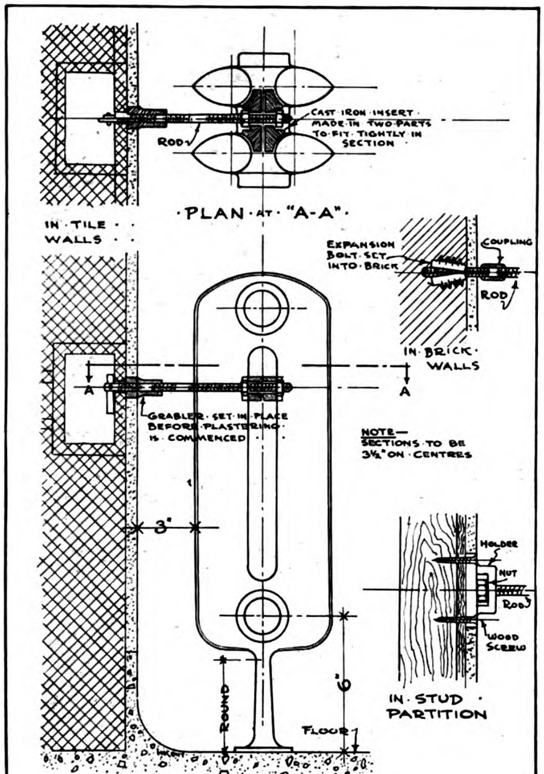
The hospital power house should be carefully laid out and equipped with the best machinery for economical generation of steam and power, as steam is required throughout the year and the use of efficient apparatus and layout will save a great deal in the cost of maintenance. In the small hospital, where hot water is used for heating, it may be pumped directly through the boilers, and in this case a separate steam boiler must be provided for sterilizing and laundry work. In the larger hospitals it is usually advisable to use high pressure water



Kitchen, Hospital for Insane, Whitby, Ont. (Plan Below)
James Govan, Architect



tube steam boilers fitted with mechanical stokers. These stokers should have considerable overload capacity, so that in case of sudden breakdown of any one boiler, the others may be able to carry the load, since the cutting down of this load may cause



DETAIL OF HOSPITAL RADIATOR SHEWING CENTRE LEG & WALL SUPPORT

HARRY H. ANGUS B.A.Sc. CONSULTING ENGINEER. 217 CONTINENTAL LIFE BUILDING - TORONTO ONT.

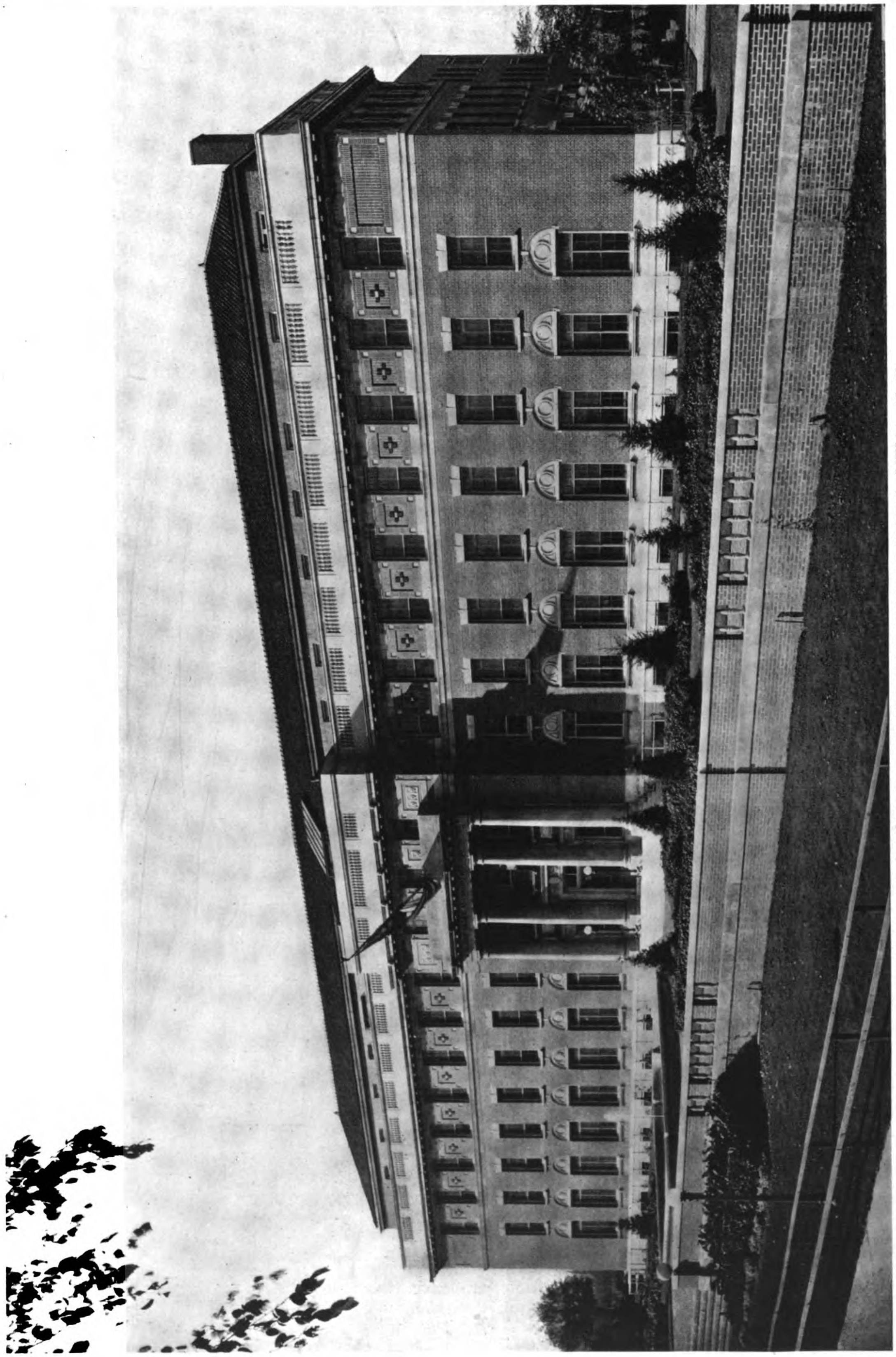
considerable inconvenience. Generally speaking, it will pay the large hospital to generate its current by engine or turbine-driven generators and to use the exhaust steam for heating, either in converters to heat the hot water for heating or domestic purposes or to carry it directly to the radiators where these are to be used as steam radiators. There should be one spare boiler at all times so that the boilers may be alternately shut down and cleaned. The power house should be provided with plenty of accurate recording meters showing the pressures, temperatures and amounts of steam, water and coal used for different purposes. These records will provide a continuous check on the operation of the plant. They should also keep the efficiency at a high point in the boiler room and also check up the waste of steam or hot water throughout the institution. By connecting meters to the main branch lines and keeping accurate records, those in authority can soon tell when steam valves are left open or hot water wasted. It is necessary to provide steam for sterilizing, cooking, and laundry work, and in order to maintain a uniform pressure at the apparatus, it is advisable to carry a boiler pressure of at least 100 pounds and reduce this to pressures required. As laundry, kitchen and sterilizers are usually located in different buildings or in different parts of the main building, it is advisable to have a separate reducing valve and piping for each of these purposes so that the pressure may be adjusted to give the best results. Sterilizers should not have a pressure of over 50 pounds by gauge. Where electric power is generated in the hospital power plant, it is advisable to heat as much domestic hot water as possible in the power house so as to use up the exhaust steam from the engines, since during the summer months especially there would be no heating load and therefore no other use for the exhaust steam.

The cost of installation of a heating and ventilating system for a hospital varies greatly, depending on the climate, the type of ventilating system, the type of buildings and the grouping of buildings. A fair average of cost would be about 15 per cent of the total cost of the hospital on institutions of 100 beds or over. The cost of operation depends on the system installed, the climate and the engineer in charge. In a climate similar to that of New York, for a complete institution about 10 tons coal will be required per patient, and the total cost of maintenance and operation with coal at $6 per ton will be about $9,500 per annum for 100 patients.

This paper had dealt only with the general principles involved. The actual design of a system for any particular hospital is a matter requiring experience and technical knowledge. This work should in all cases be handled by a competent engineer who has specialized on heating and power plant work.

Serving Pantry in Addition to Evanston Hospital, Evanston, Ill.

Richard E. Schmidt, Garden & Martin, Architects



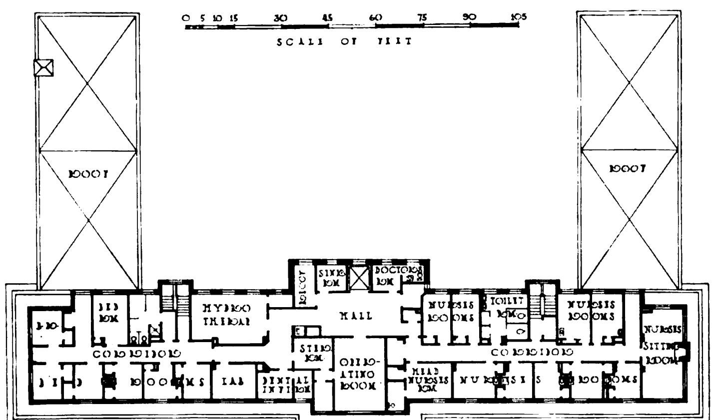
MASONIC SOLDIERS AND SAILORS MEMORIAL HOSPITAL, UTICA, N. Y.
H. P KNOWLES, ARCHITECT

MASONIC SOLDIERS AND SAILORS
MEMORIAL HOSPITAL
UTICA, N. Y.

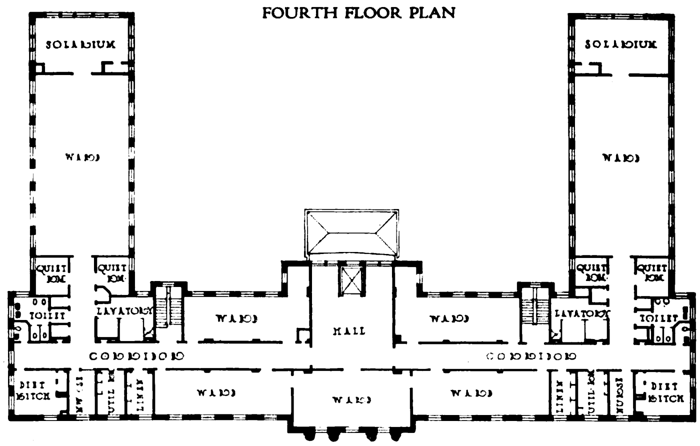
Illustrations on Plates 97 and 98

Type of construction. Fireproof
Exterior walls. Brick, limestone and terra cotta
Roofs. Slag and tile
Floors. Terrazzo and linoleum on reinforced concrete
Heating. Direct steam
Ventilation. Fans and ducts in toilets, utility rooms and diet kitchens
Windows. Double-hung with transoms
Area of building. 20,830 sq. ft.
Cubage of building. 1,020,765
Cost of building proper. $925,000
Cost per cu. ft. 90½¢
Number of beds. 240
Cubic ft. per patient. 4,253

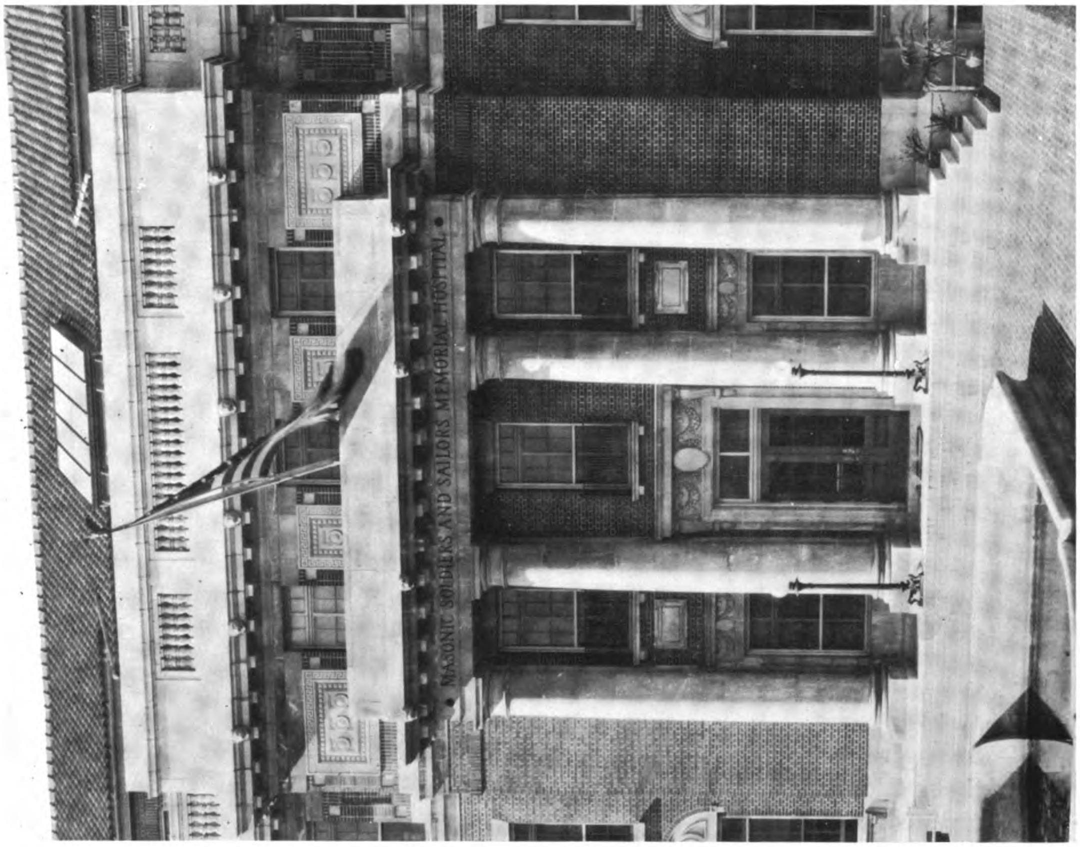
Operated in connection with Masonic home and intended for incurables and slow convalescents. Contract let at end of war at high cost level, and includes terraces and landscape work.



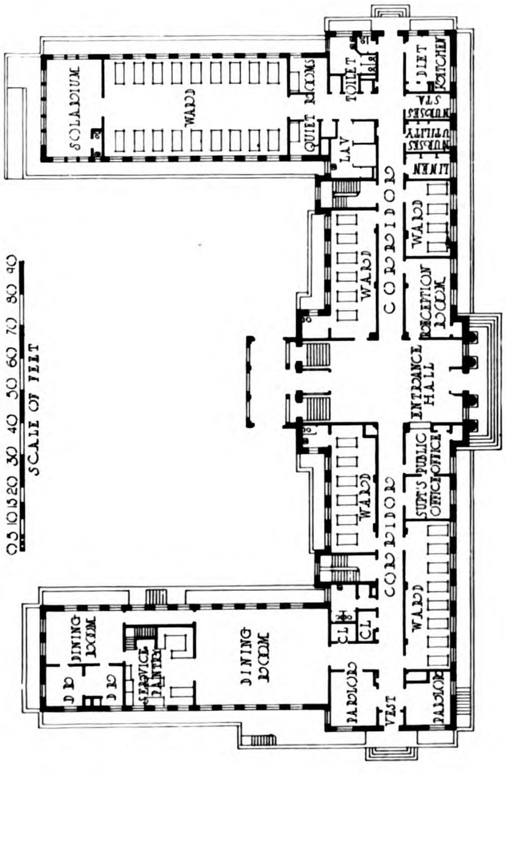
FOURTH FLOOR PLAN



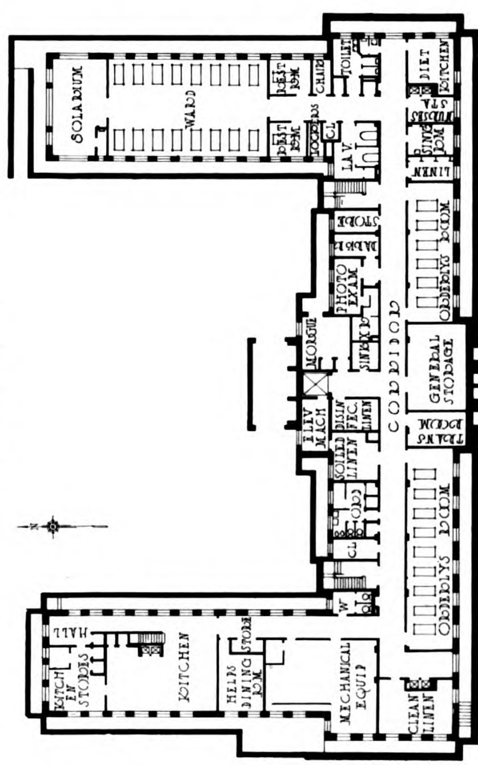
SECOND AND THIRD FLOOR PLANS



DETAIL OF ENTRANCE PAVILION



FIRST FLOOR PLAN

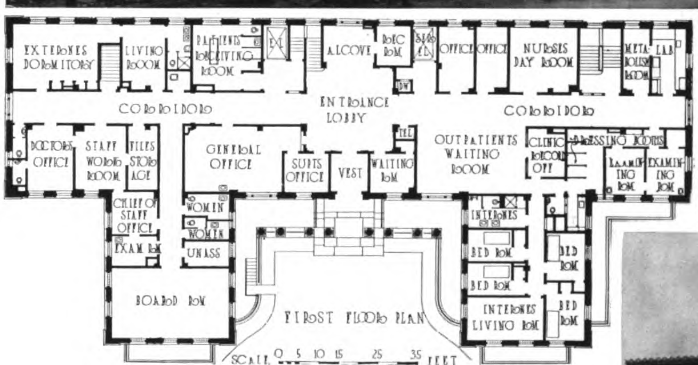


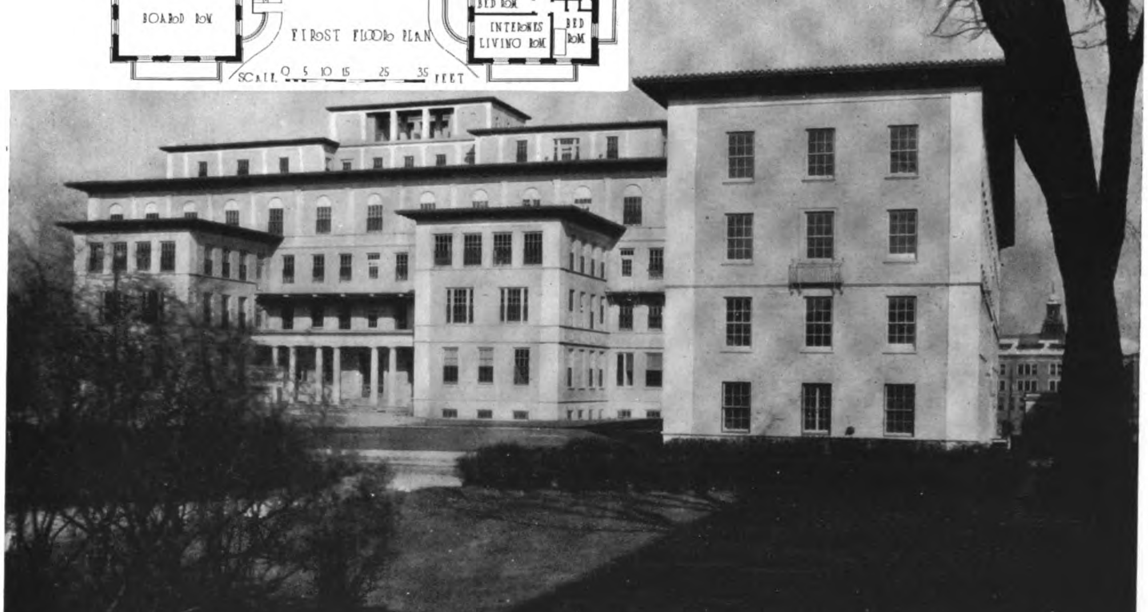
BASEMENT FLOOR PLAN

MASONIC SOLDIERS AND SAILORS MEMORIAL HOSPITAL UTICA, N. Y.

H. P. KNOWLES, ARCHITECT

HOSPITAL AND NURSES' HOME

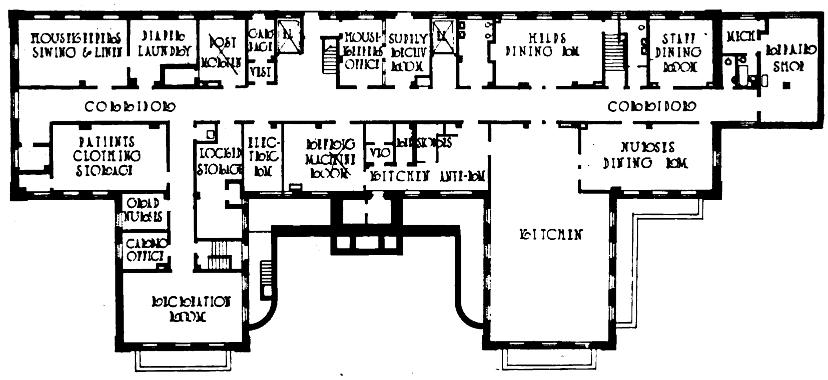




GENERAL VIEW OF ENTRANCE FRONT

BOSTON LYING-IN HOSPITAL, BOSTON

COOLIDGE & SHATTUCK, ARCHITECTS



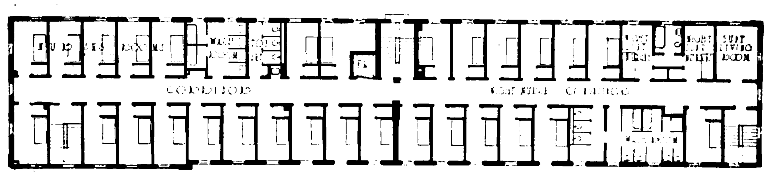
BASEMENT FLOOR PLAN OF HOSPITAL

BOSTON LYING-IN HOSPITAL
BOSTON

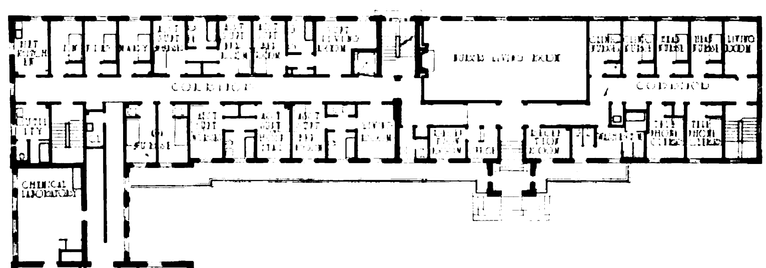
Illustrations on Plates 99 and 100

Type of construction. Fireproof
Exterior walls. Brick and cast concrete
Roofs. Tile, tar and gravel
Floors. Rubber and linoleum
Heating. Direct steam, thermostat control
Ventilation. Exhaust fans
Windows. Double-hung with ventilating sill boards
Area of building. 10,921 sq. ft.
Cubage of building. 765,268 cu. ft.
Date of general contract. June '21
Number of beds. 90
Cubic ft. per patient. 8,503

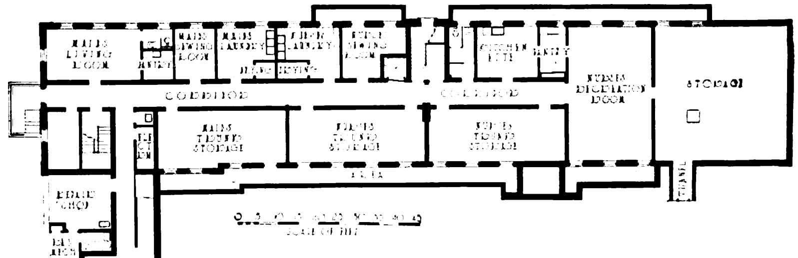
This construction includes kitchen; laundry and boiler room in other buildings. Third floor is similar to second, with exception of sick babies' nursery in place of premature nursery, equipped with wash room and room for wet nurses.



TYPICAL FLOOR PLAN

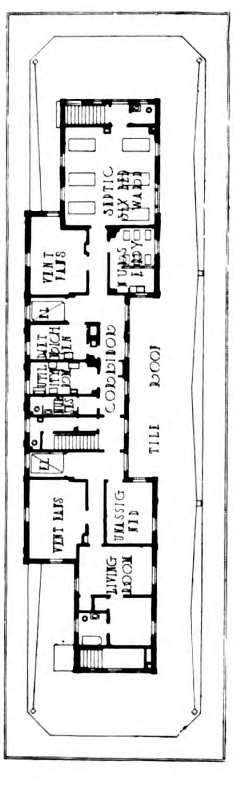


MAIN FLOOR PLAN

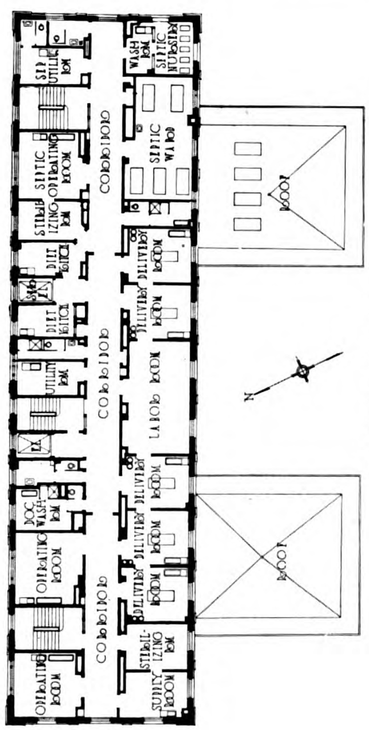


BASEMENT FLOOR PLAN (NURSES' HOME)

DETAIL OF ENTRANCE FRONT



FIFTH FLOOR PLAN

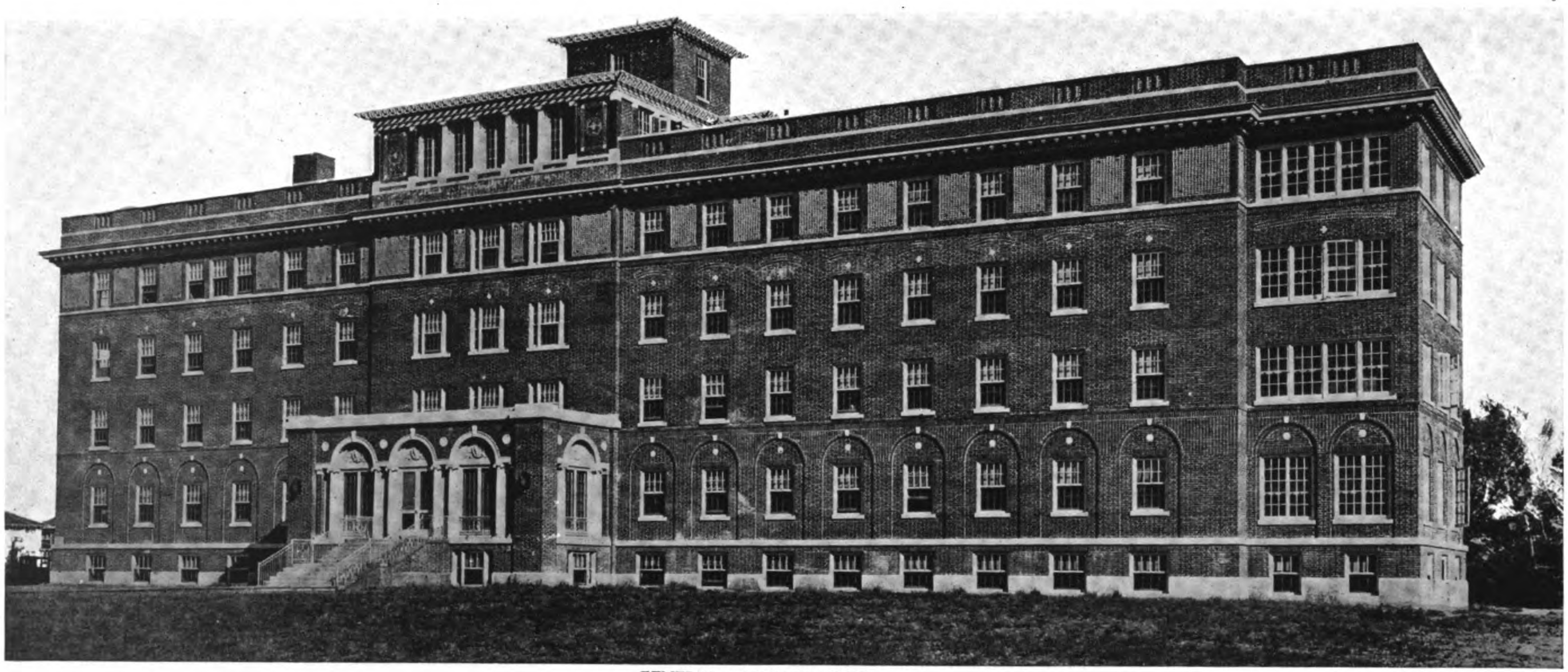


FOURTH FLOOR PLAN

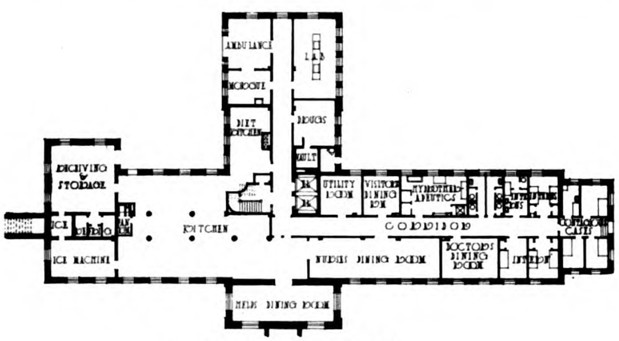
SECOND FLOOR PLAN

BOSTON LYING-IN HOSPITAL, BOSTON

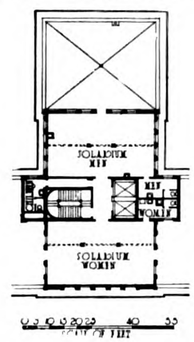
COOLIDGE & SHATTUCK, ARCHITECTS



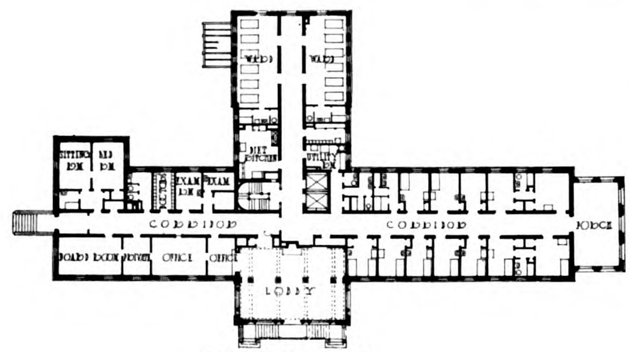
GENERAL EXTERIOR VIEW



BASEMENT FLOOR PLAN



ROOF SOLARIUM PLAN



FIRST FLOOR PLAN

WESLEY HOSPITAL, WICHITA, KAN.

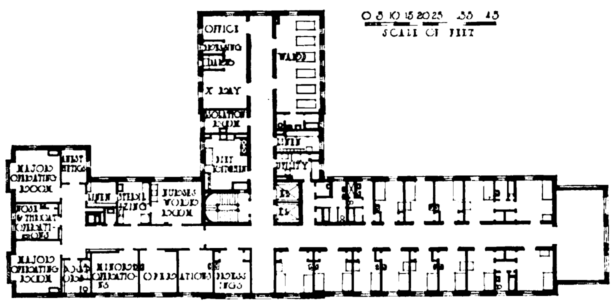
RICHARDS, McCARTY & BULFORD, ARCHITECTS

WESLEY HOSPITAL
WICHITA, KAN.

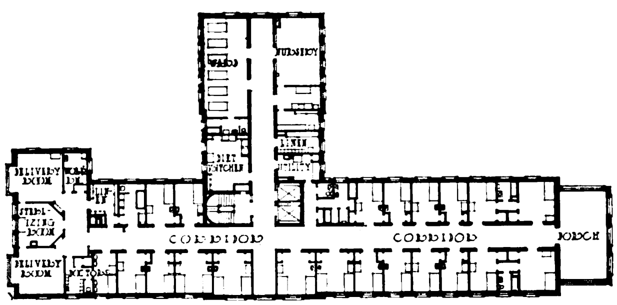
Illustrations on Plate 101

Type of construction. Fireproof
Exterior walls. Brick, terra cotta
Roofs. Composition
Floors. Cement, marble, terrazzo
Heating. Steam, vapor
Ventilation. Exhaust fans
Windows. Wood, double-hung
Area of building. 11,840 sq. ft.
Cubage of building. 774,500 cu. ft.
Date of general contract. March, 1918
Cost of building proper. $447,648
Cost per cu. ft. $61\frac{2}{3}$¢
Number of beds. 120
Cubic ft. per patient. 6,454
Cost of operating per day per bed. $3.89

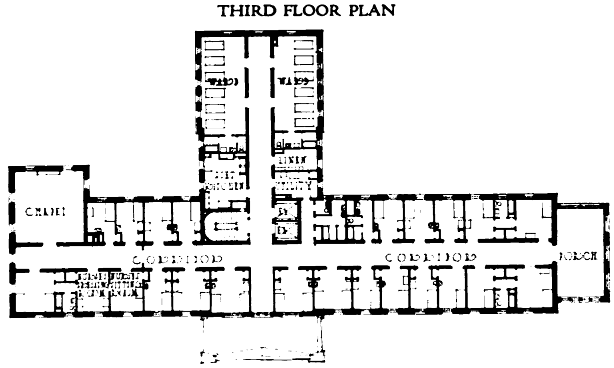
This construction includes kitchen. Laundry and boiler room provided in other buildings.



FOURTH FLOOR PLAN



THIRD FLOOR PLAN



SECOND FLOOR PLAN

Plumbing and Sanitation in Hospitals

MEYER J. STURM, A.I.A., *Architect, Chicago*

THERE is a well defined and established theory that plumbing is placed in buildings to secure safety for the public from unhealthy influences known to lurk in sewage and its gases. Therefore laws have been enacted for the purpose of protecting the public from such evils, but the very genesis of these laws defeats their end. Physics, bacteriology, pathology, sanitation and ventilation advance, and their theories and practices change so rapidly that ordinances relating to plumbing and sanitation are obsolete almost before their enactment. Most laws of this character are based on similar laws in existence where conditions may not be analogous to those locally encountered, ordinarily and frequently "colored" by politicians to meet the specifications of materials and appliances in the use of which they have a direct or indirect interest.

With these facts in mind it becomes incumbent upon the architects or engineers who are designing the plumbing and sanitation of hospitals, in which these trades are so highly specialized, to familiarize themselves with the minute requirements of such buildings and to consider the laws and ordinances as minimum only. It is not safe, expedient, or according to good practice to do otherwise. This necessarily entails, in such a highly specialized building as a hospital, the supposition that the architect or engineer knows all of the characteristics of every class of apparatus which would be attached to the plumbing or sewer lines. There is involved such a vast multitude of details necessary to attain the desired results that in an article of this character it might be well to consider this subject of "Plumbing and Sanitation" in group classes, and then to analyze these as far as possible under their group heads, such as Sewer Work; Plumbing; Plumbing Fixtures; Gas Fitting; Vacuum Cleaning Piping and Plant; Bath- and Toilet-room Furnishings.

In general, under the first three headings, would be included all of the water and sewer connections to fixtures for bathroom, toilet room, service room, kitchen, diet kitchen, laundry, hydrotherapeutic department and operating department, and the several allied special departments, and to such apparatus as refrigerating plant, etc. There can be no haphazard method of proportioning sizes, requirements or numbers of the several systems, nor of the fixtures and fittings necessary to provide these departments adequately with plumbing and drainage. All of the requirements for this work, and this must be particularly stressed, are matters of exact computation as to size and location, collectively and individually.

Sewers. Under this heading would be included all of the drainage system, or systems, as the case might be, including the house sewers, both soil and waste, all of the necessary vent stacks, branch fixture connections, sub-soil drainage, and the disposal of the rain water.

All pipes for this portion of the work, under all circumstances, inside the building especially, and so far as possible outside of the building within the premises, should be made of iron. In these days of highly specialized and standardized industries for the designing of sewerage systems it is hardly necessary to go into the methods and materials to be used. Almost any well arranged plumbing catalog will give these details. The traps, waste lines and vents of sinks into which acids or strong solutions are poured, such as are encountered in laboratories, should be made of ferro-silicon pipe. These should terminate in catch basins of the same material into which the waste of convenient fixtures may be run for the dilution of the contents before they enter the house sewer lines.

Unless main trunk sewers are very deep and the lines from the building connected to these have considerable fall, there should be back pressure valves placed on all lines where there is any danger of the sewage backing into the building. Floor drains and area drains of every character should be placed with exceeding care. Refrigerator waste lines should be made of sufficient sizes, and should terminate in small cast iron sinks and not be connected directly to the sewer. There should be clean-out fittings at the foot of all stacks, waste and soil, and clean-outs on all horizontal runs under ground, so located and spaced as to give easy rodding access.

Plumbing. To adequately describe in minute detail the plumbing required in a hospital would entail the writing of one of the most difficult and highly specialized specifications possible; therefore only a brief analysis can be given here. In all probability the most prolific source of increased cost in the maintenance of institutions is due not alone to inadequate plumbing installations, but to a lack of appreciation of the necessity of accessibility. There is always danger in the attaining of accessibility by the tyro to over-emphasize it to the extent of extravagance.

It might be well to summarize in this fashion: That the plumbing system includes the entire water supply, both hot and cold, from the house pump to the house tank and all portions between. This would include the filtered water supply, the distilled water supply and its apparatus, the heating of the water for the hot water supply, and the storage of this, the cold water supply and its storage, and the connection of these, not only to the so-called plumbing fixtures but to all of the equipment which is to be attached thereto, including the cooking apparatus, the laundry machinery and the sterilizers.

There should be valves and drains in the trunk

lines on both hot and cold water supplies. On all main branch lines there should be valves and drains, preferably at the foot of each and every set of risers in the building. In addition to these valves, without deviation, there should be a valve on each supply at every fixture throughout the building. Great care must be exercised in running the piping so that it is done in such a manner that the pipes will be accessible at all times. To accomplish this there must be provided adequate pipe shafts, chases and slots.

It is not good practice to run pipes horizontally in floors. If independent risers cannot be provided, then it would be far better to expose horizontal runs on the ceilings of the rooms below. This would entail no difficulties, inasmuch as in the standardization of floor plans for hospital purposes rooms having plumbing are ordinarily placed one above the other. Where there are only a few fixtures, such as in operating departments, it is advisable to beam or entirely suspend the ceiling below such floors rather than to run horizontal pipes in the floors. Where it is absolutely necessary to do this, such pipes should be run in continuous sleeves to allow for expansion and contraction, or if this is not possible they should be protected with galvanized iron both above and below, so that when the concrete is poured or the floor is finished the pipes will not be embedded tightly in the flooring material.

All waste lines from kitchens and diet kitchens should have grease traps. In most municipalities this is obligatory. Many institutions use the grease from these traps to make soft soap for their laundries.

The ordinary water system in the hospital need not be described here. The accompanying diagram (Fig. 1) shows a system which can be modified to meet requirements. Every hospital should be equipped with standpipes, connected either to an automatic pump or to a roof tank of sufficient capacity for fire protection. On each floor there should be a hose cabinet or cabinets, fully equipped in accordance with the Underwriters' Laboratory requirements. This not only protects against fire, but lowers insurance rates which in turn minimizes maintenance costs.

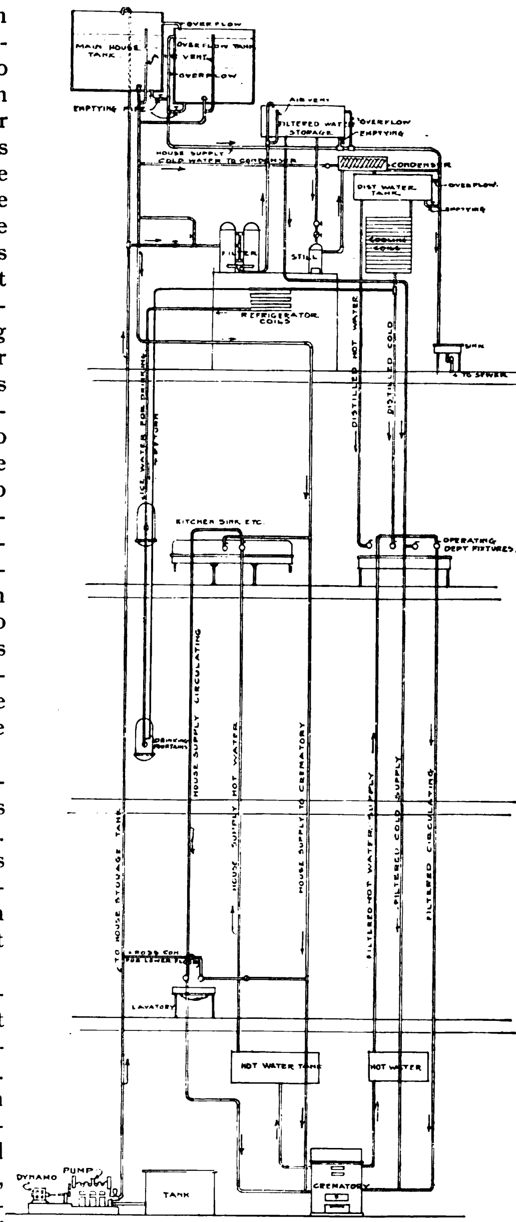


Fig. 1. Diagram of Water System for Typical Hospital Plant

It rests largely with the architect in the designing of his building as to the method most expedient for heating the water. Whether this is to be accomplished by direct fuel consumption or whether by high pressure steam or by exhaust steam would depend largely on the general equipment. It is absolutely necessary that all hot water supply should be of the circulating type in order to facilitate the drawing of hot water immediately at any tap.

One of the most difficult problems of hospital administration is dealing with the wearing off of nickel plating and the refinishing of plumbing trimmings. Polished brass requires too much attention and is subject to unsightly staining and corrosion. While this subject should be discussed under the head of "Plumbing Fixtures," it is so inseparable from continuous service and the element of lowered maintenance cost that it is well to mention it here. Any means of avoiding the discontinuance of water at any fixture, even for a short time, is to be highly recommended. All of those portions of the trimmings which come above the fixtures and which are frequently handled should be made of so-called "white metal." All those portions under the fixture may be made either of brass nickel plated, or of so-called rough brass painted. If the means are at hand to make an all white metal installation, it would be well to do so.

The sterile water supply in the operating rooms can be very readily taken care of under ordinary conditions where the sterilizing tanks are in an adjoining room, but where a number of departments are to be supplied with sterile water, such as several operating

rooms, delivery and surgical dressings rooms, the means for keeping this water sterile from the tanks to the faucets must be provided very carefully.

All pipes for conveying sterile water should be of white metal or iron pipe, block tin lined. At the sterilizers there should be placed shut-off valves, and into the sterile water lines there should be introduced a high pressure steam line so that all faucets from which sterile water is to be drawn can be opened and live steam run through. It is not safe to use so-called sterile water after it has been standing for any length of time, either in the pipes or in the sterilizers.

Plumbing Fixtures. It might be truthfully said, although it might sound trite, that "the best is none too good" when considering the selection of fixtures and fittings for hospitals, and here again there might be a dissertation in specification form.

As far as possible all plumbing fixtures should be kept away from walls, unless they have integral backs, and should be kept off the floors to the greatest possible extent. Wall hanging fixtures which have the proper support are much to be preferred to those having any connection with the floor. This is particularly true of lavatories, water closets and slop hoppers. Tubs should be built into the floor at their base and as far as possible be free on three sides so that patients can be readily handled. This need not necessarily apply to the bath tubs in nurses' or internes' quarters. The object of hanging fixtures in the manner described is not primarily one of sanitation but one of expedience in keeping the hospital clean with the least expenditure of time and labor.

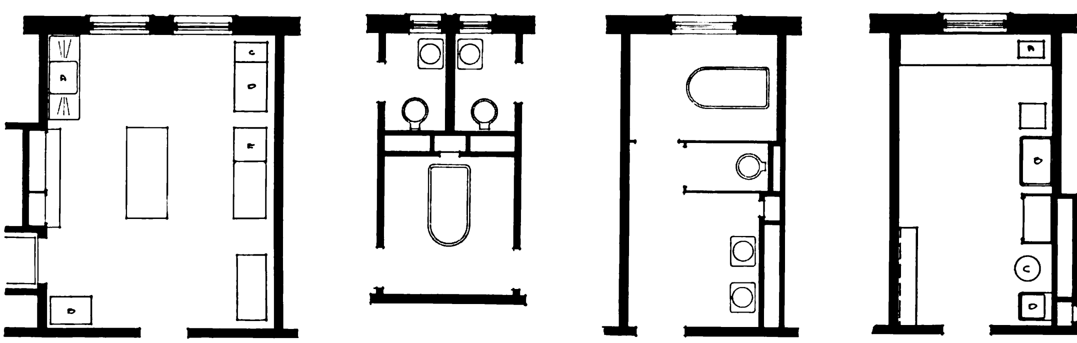
Ordinary bath- and toilet-room equipment, including the wash-up sinks and showers, need only to be mentioned. For the wash-up sinks and showers some special methods of handling the water should be provided. In the former some form of foot-, knee-, or elbow-operating valve is preferable. The foot-operated valve should be of the box type, flush with the floor. Both in this class of apparatus and in the showers there should be installed anti-scalding mixing valves, swinging or gooseneck spouts and rose spray connections.

All plumbing fixtures, especially those in hydrotherapeutic departments, operating departments, kitchens and service rooms, should be carefully selected and properly installed. Supplies to hoppers in service rooms should be operated by flush box foot valves, and all flushing valves should be similarly operated. Lavatories should have non-splashing rims and hooded, integral overflows.

The number of closets would largely depend upon the number of patients per floor, but under ordinary conditions one water closet in each such room will adequately take care of from 10 to 15 patients. One lavatory in each such room would also be sufficient. We are dealing with hospitals, and the majority of patients are bedridden; it is only those who are recovering and those who have long continued treatment and who are up and about, who use these bath- or toilet-rooms. A nurses' toilet, containing a closet and lavatory, should be provided on each floor. Such toilets are ordinarily placed in or near the nurses' stations.

There should also be a porters' sink on each floor in a separate space provided for the purpose. The room should be well ventilated. The supplies on the sink should be sufficiently high to permit the pails to be placed in the sink. Spouts should have pail hooks and supports. Wastes from these sinks should be at least 3-inch.

Under ordinary circumstances, in the moderate sized hospital, one service room on each floor would be sufficient if this one were properly equipped and located. The service room equipment varies somewhat in different institutions, but in general the function of this room is to take care of all of the so-called "dirty work" excepting the cleaning of floors, scrubbing and the like. Therefore, in this room there should be provided a slop hopper with a deep water seal. This fixture should have foot pedals for the operation of the flush and for the operating of the hot and cold water, so that the nurses may have both hands free to handle the bedpans. If there is no bedpan sterilizer provided in such a room, as there should be, then a swinging jet should be put in the hopper for the purpose of cleansing bedpans. The bedpan sterilizers are properly to be considered



Diet Kitchen
A. Sink
B. Refrigerator—drain
C. Hot plate—gas
D. Steam table—water and waste
E. Dish washer—water and waste

Toilet and Bath

Private Toilet and Bath

Service Room
A. Hot plate—gas
B. Flower sink—water and waste
C. Bedpan sterilizer—water and sewer
D. Slop hopper—water and sewer

Plumbing Fixture Arrangements for Some Typical Hospital Rooms

as part of the plumbing equipment and must be connected to the soil system and have both hot and cold water supply.

Diet kitchens should be equipped with sinks with two drain boards. If these are of enameled iron the drain boards and back should be integral. If the sinks are made of vitreous ware they should have integral backs, and the drain boards should be made of ash with rim. If it is desired, one of these drain boards can be made with a telescopic leg so that the board can be folded against the wall.

Main kitchen departments should be provided with scullery sinks, dish-washing machines, glass and silver sinks, cooks' table sinks, vegetable, poultry and meat-washing sinks. These fixtures need not necessarily be in one room provided separate rooms are planned for the departments. The bakery would have sink as required. Where dish-washing sinks and dish-washers are installed, it is necessary to have floor drains properly connected.

Where there is provision made for special drinking water service the faucets for drawing this water may be placed on certain designated fixtures throughout the building, but it has been found more practical and somewhat more convenient to install drinking fountains for this special purpose. Where drinking fountains are used they should be of the recessed type, and the faucets should be high enough or so arranged that a pitcher used in drawing water can be conveniently placed under them. Whether a bubbler is necessary must be decided by the authorities of the individual hospital in which this service is installed.

Operating room sinks should be vitreous or semi-vitreous, and should be provided with both "tap" and sterile water. Such sinks should be sufficiently large to permit two persons to wash at the same time. Use of floor drains in operating rooms is optional with the hospital administrators. There seems to be an equally divided opinion as to their necessity or usefulness. Doctors' wash-up rooms should be provided with lavatories, showers and water closets, as required by the size of the institution, the number of operating rooms, etc. Sterilizing room equipment should consist of a deep sink with integral dished drain boards and backs. These can be procured in either enameled iron or porcelain.

The main laundry should be provided with necessary gutter and floor drains, laundry tubs and toilet rooms. The toilets should be equipped with showers and dressing rooms in addition to the fixtures ordinarily installed in such rooms.

In general, the quality, kind and finish of fixtures must be left to the choice of the individual architect, or to the board, or to both, but there are certain considerations in hospital work which are not encountered ordinarily in other classes of buildings. One of these is that the hospital must be used constantly. There is no opportunity for making extended repairs or to shut down any one department for any length of time without crippling the entire service. If there were unlimited means, one could provide for such a contingency by putting in duplicate, or at least more than a sufficient number of any one department or of fixture so as to adequately care for the needs of the institution. If, however, such an unnecessary procedure can be avoided by the simple expedient of installing the proper fixtures at the outset, it would be highly desirable that it be done.

In actual practice it has been found that all water closets should be if possible of the wall-hung type, equipped with flushing valves. Lavatories of the same material should also be of the wall-hung pattern. A good enameled iron tub will give practically endless wear, and now has an unlimited guarantee.

Scullery sinks should be made of metal. Such fixtures as slop sinks and ordinary sinks, including kitchen and diet kitchen sinks, if made of good enameled iron, will stand the test of wear and time. Unfortunately, large pieces cannot be made in vitreous china without being badly distorted. If it were not so this undoubtedly would be the ideal material for practically all of the plumbing fixtures in an institution.

Gas Fitting. It is particularly desirable that the gas fitting in institutions should be carefully laid out. First, there should be such exit lights as are required by ordinances. Secondly, irrespective of what character of apparatus is to be used in certain departments, gas should be supplied and the requirements ascertained previous to the installation so that these supplies will be adequately large. This would include the piping to laboratories, service rooms, diet kitchens and main kitchens.

Emergency lights and outlets should be placed in at least one position in each of the so-called operating and service departments of the institution and in a few selected locations in each corridor. A word as to these emergency lights will suffice. They should be placed without elaboration and with the utmost care to provide temporary light only.

Vacuum Cleaning and Plant. There has been some discussion as to the expediency of installing vacuum plants in small institutions, but there can be no question as to their desirability in the larger hospitals, and by this is meant those having from 75 to 100 beds and upward. The plant itself should be placed in such a manner as to preclude the possibility of causing noise, and it should be so attached to the system as to exclude this possibility. Great care must be exercised in proportioning both horizontal and vertical runs. All turns or changes in directions of the piping should be made with long turn recessed fittings. Risers should be so placed and outlets provided that it will not be necessary to use a hose over 50 or 75 feet in length. This will preclude the possibility of the hose and process becoming too cumbersome. It is not the function of this article to describe the different plants, excepting to make the statement that the electrically-driven machine is preferable.

Electrical Wiring and Equipment for Hospitals

By NELSON C. ROSS, *Associate Member, A.I.E.E.*

THE electrical equipment of the modern hospital will include general lighting service throughout offices, corridors, domestic and public sections; special lighting of patients' rooms, wards and operating rooms; electrical power for cooking and the operation of elevators, X-ray equipment, electrical sterilizers, mechanical refrigeration, laundry and other machinery, as well as low tension apparatus, including clocks, bells, telephones, nurses' calls and signaling systems.

The building being of first class construction, the wires of all systems will be run in conduits, these concealed, since in hospital practice it is of importance that all switches, panelboards, cabinets, etc., should be set flush with the walls, and that there should be no conduits or other exposed work to catch dust.

The hospital as a rule will include a boiler house apart from the main buildings, containing the boiler plant of the heating system, the refrigerating machinery and the hospital laundry. Further, in the event of an electrical generating plant's being considered, this also will be installed in the boiler house, and as it is separated from the main buildings the noise of the machinery will not be communicated to the hospital.

As the boiler plant is the center of distribution for the heating system, the boiler house should also be made the center of distribution for the electrical system, and the service switchboard should be located in the boiler house and under the direct charge of the engineer. In the event of a generating plant's being installed, the service switchboard becomes the feeder panels of the plant switchboard. If a plant is not installed, the street mains will connect directly to the service switchboard and distribute through switches to the feeder circuits supplying the hospital building or buildings.

Transformers may be located on poles in the street, or in pits in the street where underground service is supplied, and the secondary circuits from the transformers carried to the service switchboard. It is to be preferred, however, that a transformer vault be incorporated in the boiler house, so that the transformers will be accessible at any time for the replacement of fuses or for replacement or repair of the transformers. In designing the vault, a floor space with dimensions of approximately 12 x 8 should be allowed, with full headroom, and all doors and passages to the vault should be not less than 36 inches in width to permit the transformers to be removed and replaced if desired. The vault should be fireproof, and fitted with an underwriters' door with lock. The floor should be drained, a 6-inch cement curb provided at the door, and the vault should be vented to the outside air with not less than 60 square inches of duct. It is well to provide a cement curb or bed in the vault 6 inches in height on which to mount the transformers.

Primary mains should be carried into the vault through a tile or fiber duct, this being installed underground, and all primary cables being sheathed with lead. As a rule a three-phase power service requiring three No. 4 primary wires, and a single-phase lighting service requiring two No. 4 primary wires will be used, the primary service delivered at 2,300 volts. Secondary circuits for both lighting and power should be run from the transformers to the service switchboard in steel conduits.

The lighting service should be developed on a single-phase, three-wire system of wiring at 110-220 volts, the power service on a three-phase system at 220 volts. It is advisable to use a pressure of 220 volts for the power service, even though the customary power service in the locality be 550 volts, as hospital service requires a large number of small motors throughout the laundry, kitchens, laboratories, etc., and for use with portable equipment; these are as a rule operated more or less by women, and the use of a 550-volt power service introduces an element of danger that is not present when 220-volt service is in use. The switches and controlling equipment for small motors operating at 550 volts are larger and more expensive than like equipment for 220-volt service, and these are more difficult to install where the wall space is limited, and are at best unsightly.

With a service tunnel between the boiler house and the hospital, all feeder wires should be run in the tunnel, and should terminate in a distributing switchboard in a service room at some point on the basement floor; this switchboard should control both lighting and power risers, through fused switches.

The panelboards controlling branch circuits are located on the different floors and are so spaced that the average length of the branch circuits does not exceed 80 feet. Where possible the panels should be connected so that each floor has a separate riser circuit from the distributing switchboard; thus not more than one floor is without light in the event of a riser fuse's opening. Where possible, separate panelboards should be installed for the control of the lighting of the operating rooms, the lighting of these rooms to be controlled on two circuits (one-half of the lighting on each circuit), there being one riser from the distributing switchboard and an emergency riser from the service switchboard in the boiler house.

Electrical Cooking. Small electrical ranges, warming ovens and hot plates are taking the place of gas stoves for use in diet kitchens and treatment rooms, and provision should be made for their use. A riser may be carried from the distributing switchboard and may connect the outlets of the diet kitchens, with a similar riser for the outlets

of the treatment rooms, the outlets looping on the riser, and full sized copper connecting all outlets. The load at each outlet may be from 1,000 watts, where small hot plates are used, to as high as 5,000 or 6,000 watts with the use of small ranges; as a rule, the riser connecting three or four diet kitchens should not be smaller than three No. 4 wires. If desired, the outlets may consist of 30-ampere, 3-pole flush stage pocket receptacles, or permanent conduit connections may be made with the equipment.

Where electrical cooking is to be used in the main kitchens, and in the bakery as auxiliary to the coal or gas ranges, separate feeder circuits should be run from these outlets back to the service switchboard in the boiler house; if possible these circuits should be fed from the power service in order to obtain a "power rate." The ranges are designed for operation on a three-wire, 110-220-volt circuit, and if connected to one phase of the power service a balance coil should be used in order to give the proper voltage. The ranges and bake ovens will require from 8,000 to 20,000 watts (depending on the size of the ranges, etc.) when operating under full heat, and the feeder copper should be proportioned for the full load current.

Sterilizers. The larger sterilizers will be operated from high-pressure steam; provision, however, should be made in each operating room and in each treatment room for the use of electrical instrument sterilizers, wall receptacles of not less than 20-ampere capacity being used, permitting sterilizers of other portable equipment to be operated by being plugged into these receptacles.

Power Circuits. Separate power circuits will be run from the service switchboard to the refrigerating machinery and other motors in the boiler house. The modern laundry will be equipped with a master switchboard, generally furnished with the laundry equipment, from which all motors in the laundry will be mastered, a separate feeder running from this switchboard to the service switchboard. Separate power circuits will be run from the laundry switchboard to each of the motor-driven laundry machines, the conduits being concealed in the floor slab and turning up from the floor slab to the motors, making a waterproof installation.

The elevator machinery for a hospital building should be located when possible on the basement floor, in order to prevent vibration and noise being communicated to the building; the power circuit should be run from the distributing switchboard in the basement, and should be terminated at the location of the controller in readiness for final connection by the elevator contractor.

Where stationary X-ray apparatus is to be used, a separate feeder circuit should always be run from the distributing power panel for the control of this equipment, the copper sized for the full capacity of the equipment used. In addition to this a circuit of two No. 4 wires should be run from the distributing switchboard, this circuit looping to each corridor on the different floors, and a high capacity wall receptacle should be installed in the corridor so that portable bedside equipment may be used and operated from these receptacles. The receptacles may also be used for the operation of portable vacuum cleaning equipment.

Lighting Fixtures. Hospital lighting fixtures are finished in white enamel, and are of a plain design with full, smooth lines and without corners or projections that may serve to catch dust. Such fixtures in the rosette, ceiling collar and bracket form are made up in porcelain. Patients' rooms require either ceiling fixtures or wall brackets over the beds; in many cases both are used, there being one ceiling pendant controlled by a switch at the door, the brackets being controlled from chain sockets. If it is desired that the patient may not use the light without the consent of the nurse, a switch may also be installed to control the brackets. As a wall receptacle is installed at each of the beds, this also permits the use of a portable fixture at the bed if desired.

The wards will require both pendant ceiling fixtures for general illumination and brackets at the beds. The ceiling fixtures should in all cases be double-circuited and should be fitted with lamps of low wattage for "all night use" as well as with one or more large lamps for general illumination of the room, both circuits being controlled from switches at the entrance door.

There are many different types of lighting fixtures available for operating rooms, the requirements being a strong light projected on the operating table, the lamps being enclosed in diffusing glass to prevent glare, and so placed in the fixture that there will be no shadow on the patient when the surgeon is operating. This is sometimes accomplished by placing the outlet over the table and mounting the lamps on a large ring, each lamp being focused on the table, or by placing the lamps and reflectors behind some type of prism glass. The writer has found it good practice to use four outlets over an operating table, these set approximately 6 or 8 feet apart and over the corners of the table, a pendant fixture fitted with high wattage lamps and diffusing glass being installed at each outlet. It is of importance that the fixtures in operating rooms be connected on two circuits, and if possible fed from two sources of supply, so that all light will not be cut off in the event of a fuse's opening on the circuits; it is also advisable that separate circuits be run to each of the operating rooms from the panelboards. In addition to the ceiling fixtures there should be portable floor stands provided for use in each operating room, these arranged to be plugged into any of the wall receptacles.

The fixtures throughout the treatment rooms, diet kitchens, utility rooms, main kitchens, etc., are of the collar type and are installed close to the ceiling and fitted with some type of opal glass that may be easily cleaned. In addition to the ceiling lighting, receptacles and lamps should be located

under the range hoods, so that these lamps will give direct light on the ranges and kettles.

Low Tension Equipment

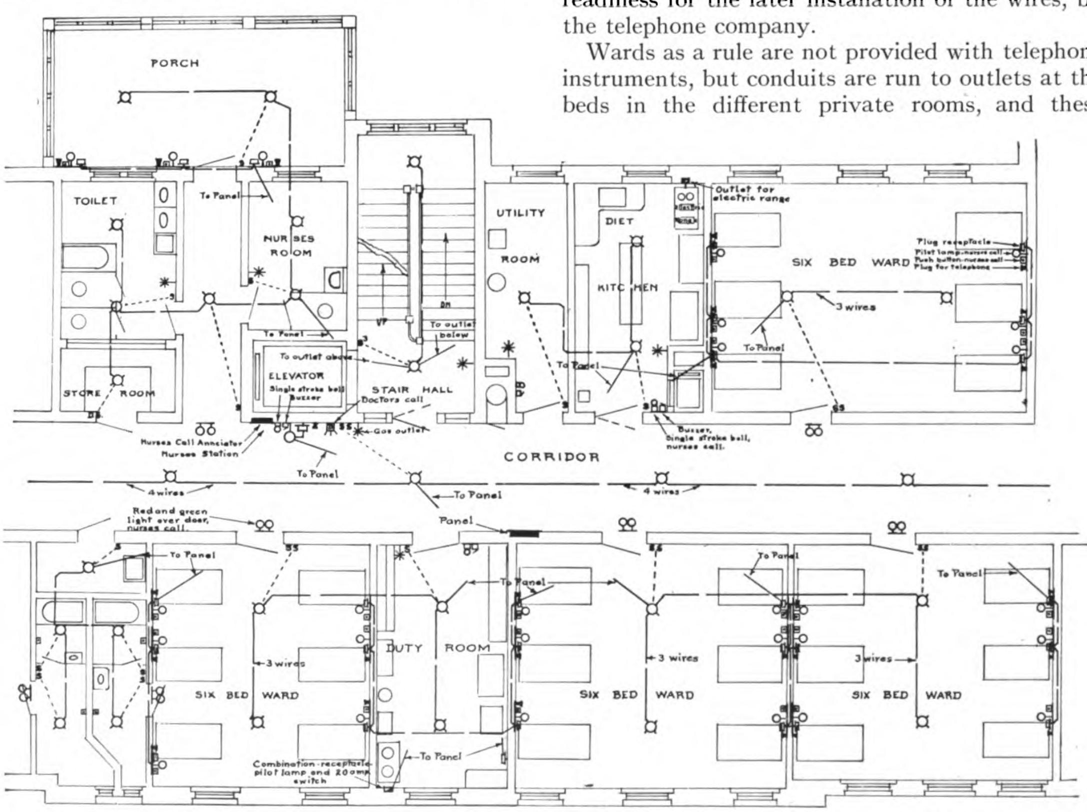
Nurses' Call System. Each floor where there are wards and patients' rooms should be fitted with a separate "nurses' call" or signal system by which the patients may call the nurses when desired. Broadly, the system consists of an annunciator at the nurses' station in the corridor, with patient's button at each bed; a canceling button is also placed at the bed, together with an emergency call-button, pilot lamp, telephone jack and lighting receptacle. Over each door from the corridor there are placed a red lamp and a green emergency lamp.

In the operation of the system, the patient calls the nurse by pressing the patient's button; the red lamp over the door lights, and the annunciator lamp corresponding to the number of the station also lights, both remaining lighted until the nurse cancels the line at the bed. The nurse does not cancel the line until ready to leave the patient, so that the lighted lamps on the annunciator and over the door indicate where the nurse may be found. If upon visiting the patient the nurse requires help, she presses the emergency button which lights the green lamp over the door, and anyone seeing the green lamp lighted immediately goes to the assistance of the nurse. In addition to all this, a signal lamp and bell signal are located in each diet kitchen, treatment room and utility room, and these are connected with all the bed signals, and indicate to any nurse in these rooms that a patient has called.

If a permanent record is required, a time recorder may be located in the office of the superintendent or elsewhere. This is an instrument that indicates on a chart the time that each call is made and the time that it is answered and canceled. The system on each floor should be separate from the others, and each should be controlled from the annunciator at the nurses' station. In two-bed wards or in private rooms the pilot lamps at the beds may be omitted; in large wards, however, these pilot lamps should be used, as the light at the bed indicates to the nurse entering the ward the location of the patient who has made the call.

The Telephone System. While private telephone systems are used at times in the smaller buildings, hospital practice requires that the public telephone service be available at nearly all points, and the buildings are usually fitted with public branch telephone exchanges, the switchboards being located in the general offices and at all times under the charge of operators. The wiring contract should provide for a complete raceway of empty conduits from the telephone switchboard to the different telephone instruments, the raceway being left in readiness for the later installation of the wires, by the telephone company.

Wards as a rule are not provided with telephone instruments, but conduits are run to outlets at the beds in the different private rooms, and these



Typical Hospital Floor Plan, Showing Arrangement of Outlets for Lights, Plug Receptacles, Telephones, Doctors' Call and Nurses' Call Systems

outlets are fitted with jack receptacles. When a patient is permitted to have a telephone, the cord is plugged into the jack. It is not always possible, in laying out the work, to determine the rooms or groups of rooms that should be supplied with telephone service; the empty conduits to the rooms, however, are not of great expense.

With many instruments closely grouped on each floor, connecting cabinets may be located in the corridors and connected with the switchboard through cables in a single conduit, all runouts from these cabinets to the individual outlets being made with twisted pair, telephone conductors. Where the outlets are scattered it is well to consider twisted pairs from the main connecting cabinet to the instrument.

The telephone outlets should be the standard outlet boxes as used for the lighting service, these fitted with switch covers permitting the boxes to be covered with blank switch plates when not in use. For wall instruments the outlet boxes are set 60 inches above the floor, the instruments covering the boxes. For desk instruments the boxes are set at the baseboards. At the patients' beds the boxes are set in line with the outlets of the nurses' call system, and are covered with one gang plate. In sizing conduits for twisted pairs not more than two pairs should be run in a ½-inch conduit, four pairs in a ¾-inch conduit, and six in a 1-inch conduit.

The Doctors' Call System. Some provision must be made so that the telephone operator may get in immediate touch with any of the doctors present in the building. To do this by use of different telephones would prove confusing and would require considerable time. A call system is therefore installed, with a calling station at the telephone switchboard and receiving stations located throughout the corridors on the different floors, the receiving stations being not more than 75 feet apart. The receiving stations may consist of lamps behind numbered glass, each number indicating the person desired, or they may consist of bells or buzzers, on which a code signal is rung, or else they may consist of loud speaking telephones which transmit the voice of the telephone operator, announcing that a certain doctor is wanted at the nearest telephone.

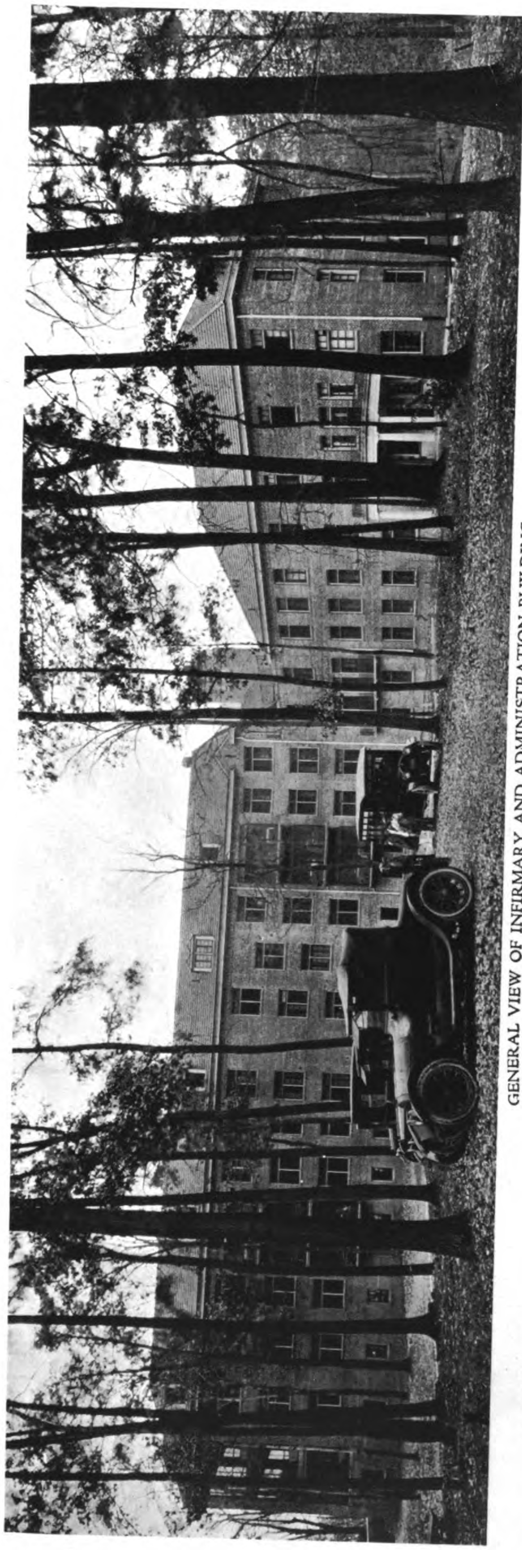
The Ambulance Call. If an ambulance is used at the hospital, a gong should be located at the ambulance station, with a push-button at the telephone switchboard so that a signal may be given by the operator when the ambulance is required.

Bells and Annunciators. The office sections of the hospital may require bell and signal systems between offices, or between offices and desks. The layout however cannot well be determined until the desk layout and office requirements are known. The wires of the systems should be run in conduits, using No. 16 rubber-covered wires, and taking current from the batteries of the nurses' call system. For desk work the conduits should be concealed in the floor slab and either bulb tees or waterproof floor boxes should be employed at the outlets, thus permitting a waterproof flush plate to be installed on the floor box in the event of changes being made in the location of the furniture.

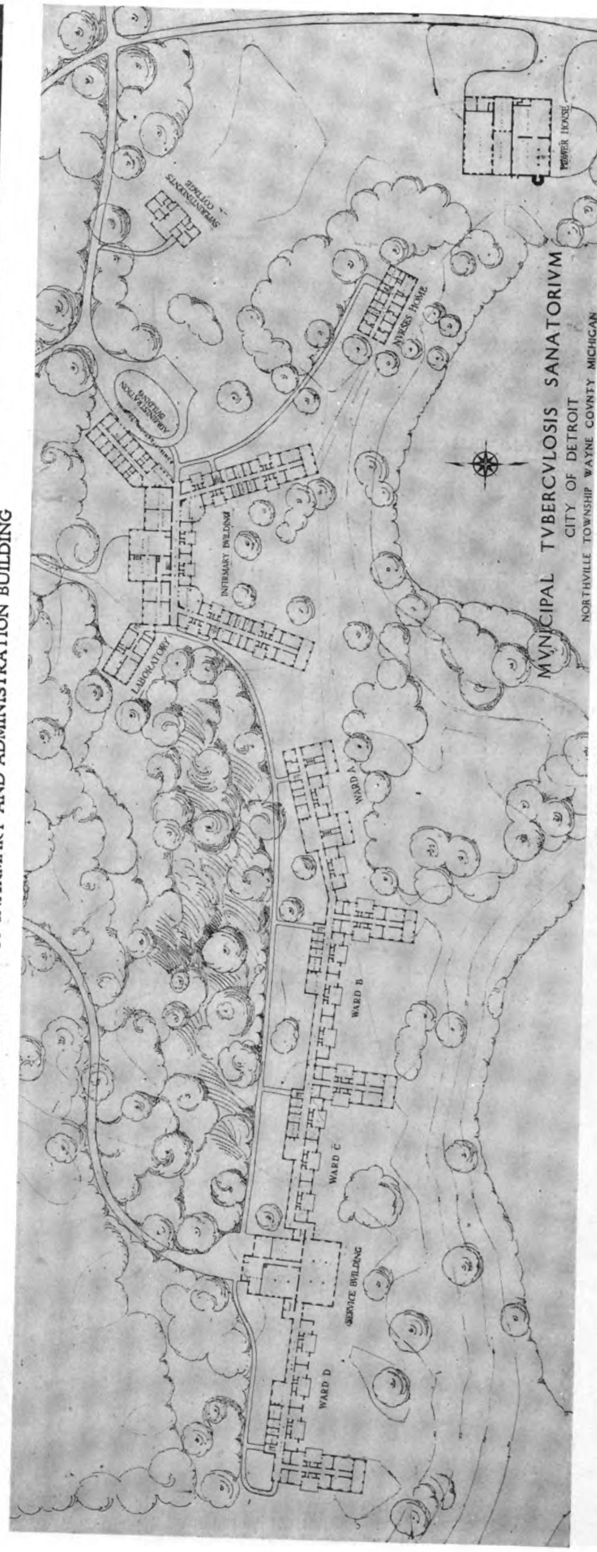
The Clock System. Where standard time is required, the electric clock system is used, the master clock being located in the main corridor or in the office, with secondary movements throughout the corridors, in the kitchen, laundry, boiler house, offices and public rooms. The secondary clocks are of plain pattern, made up with smooth lines and without mouldings or corners; the clocks are finished in white enamel. Either the series or the multiple system may be used, the clocks operating from a storage battery at 24 volts. All wires are run in ½-inch conduit, the clock circuits leading back to the outlet of the master clock. All circuits are of No. 14 rubber-covered wire. With the series system not more than 18 clocks should be connected on one circuit; with the multiple system as many as 50 or 60 clocks may be connected on one circuit. The battery should be located in the service room, and two No. 12 wires carried from the battery to the master clock. It will be advisable to consider the installation of an automatic battery charger operated from the master clock. This instrument automatically charges the battery a determined number of minutes during each hour, thus keeping the battery always in good condition. The charger is located at the battery, and is connected in one of the clock circuits with No. 14 wire.

The Fire-alarm System. It is an open question as to whether a fire alarm system is to be desired in a fireproof hospital building, as there may be more danger from alarming the patients due to accidental operation of the system than from actual fire. Provision should be made in any event for a city box at a point near the hospital or in the hospital building. If a system is considered for the buildings, it should be of the closed circuit type, with alarm gongs in the boiler house and at such other points as may be necessary to call the hospital fire department in the event of an alarm's being rung in from any of the stations.

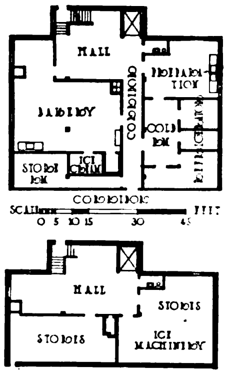
Watchman's Clocks. It is obvious that a watchman will not be required in the sections of the buildings where the nurses are on duty throughout the night, and any patrolling of these sections would prove disturbing to the patients. The basements, unoccupied sections, laundry, storerooms, etc., should be patrolled and some type of check on the watchman is required. If desired, a portable watchman's clock can be used, this carried by the watchman, the numbered keys being securely chained at the watchman's stations. The watchman carries the clock to the key and inserting the key in the clock "rings up" on the clock dial. This system requires no wiring. If the magneto system is desired, the master clock is located in the office, and a magneto of either the flush or surface type is installed at each station, the watchman inserting a portable crank in the station "rings up" on the master clock.



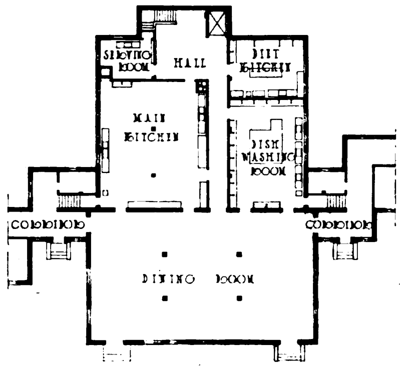
GENERAL VIEW OF INFIRMARY AND ADMINISTRATION BUILDING



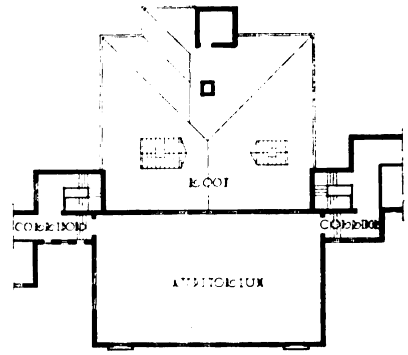
GROUP PLAN
MUNICIPAL TUBERCULOSIS SANITARIUM FOR CITY OF DETROIT,
NORTHVILLE TOWNSHIP, WAYNE COUNTY, MICH.
STRATTON & SNYDER, ARCHITECTS



BASEMENT AND SUB-BASEMENT PLANS



FIRST FLOOR PLAN



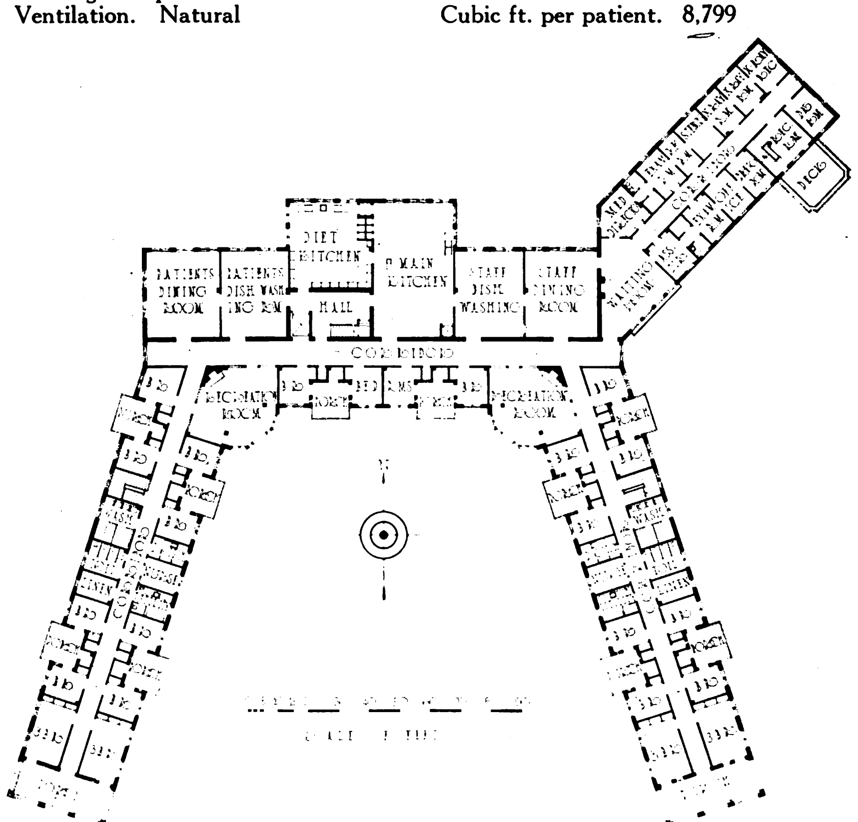
SECOND FLOOR PLAN

SERVICE BUILDING
MUNICIPAL TUBERCULOSIS
SANITARIUM FOR CITY OF DETROIT

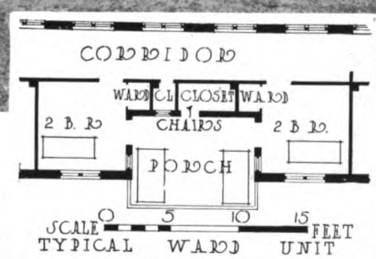
Illustrations on Plates 102 and 103

Type of construction. Semi-fireproof
Exterior walls. Face brick and hollow tile backing
Roofs. Tile
Floors. Tile and oak on reinforced concrete
Heating. Vapor vacuum
Ventilation. Natural

Windows. Casement
Area of building. 200,637 sq. ft.
Cubage of building. 2,639,762 cu. ft.
Date of general contract. March, 1920
Cost of building proper. $1,695,000
Cost per cu. ft. 64.2¢
Number of beds. 300
Cubic ft. per patient. 8,799



MAIN FLOOR PLAN OF INFIRMARY BUILDING

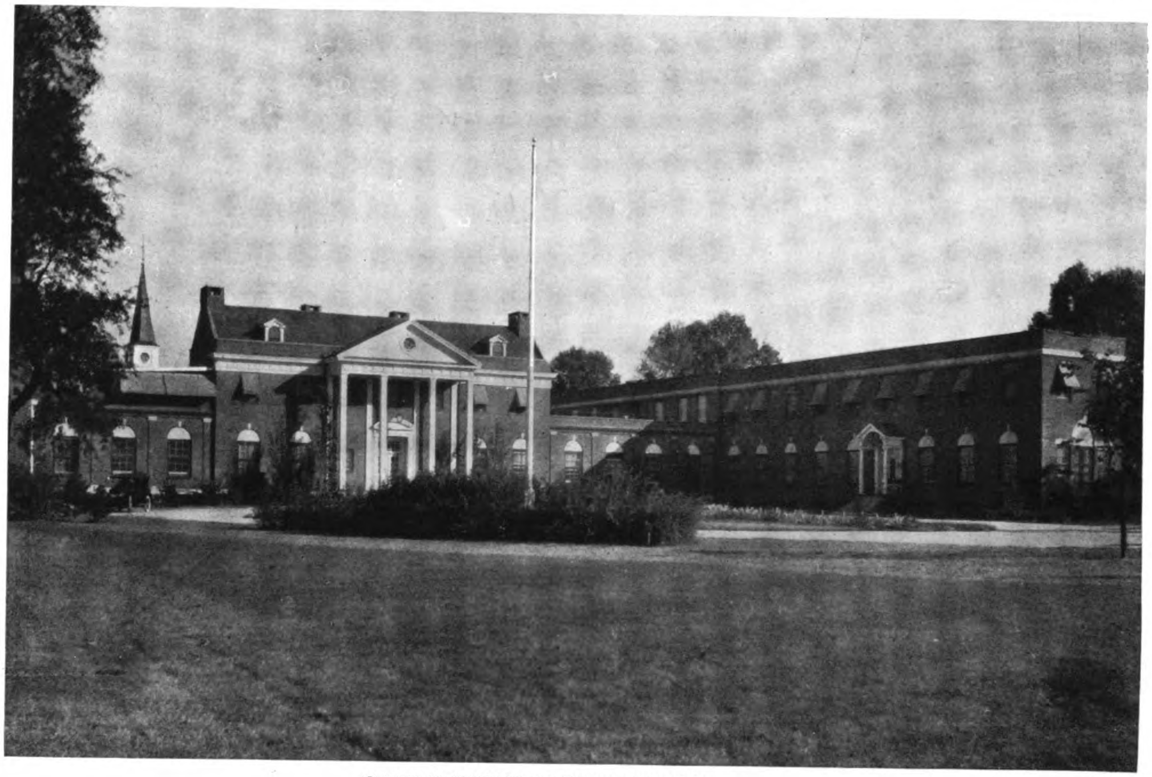


TYPICAL WARD BUILDING

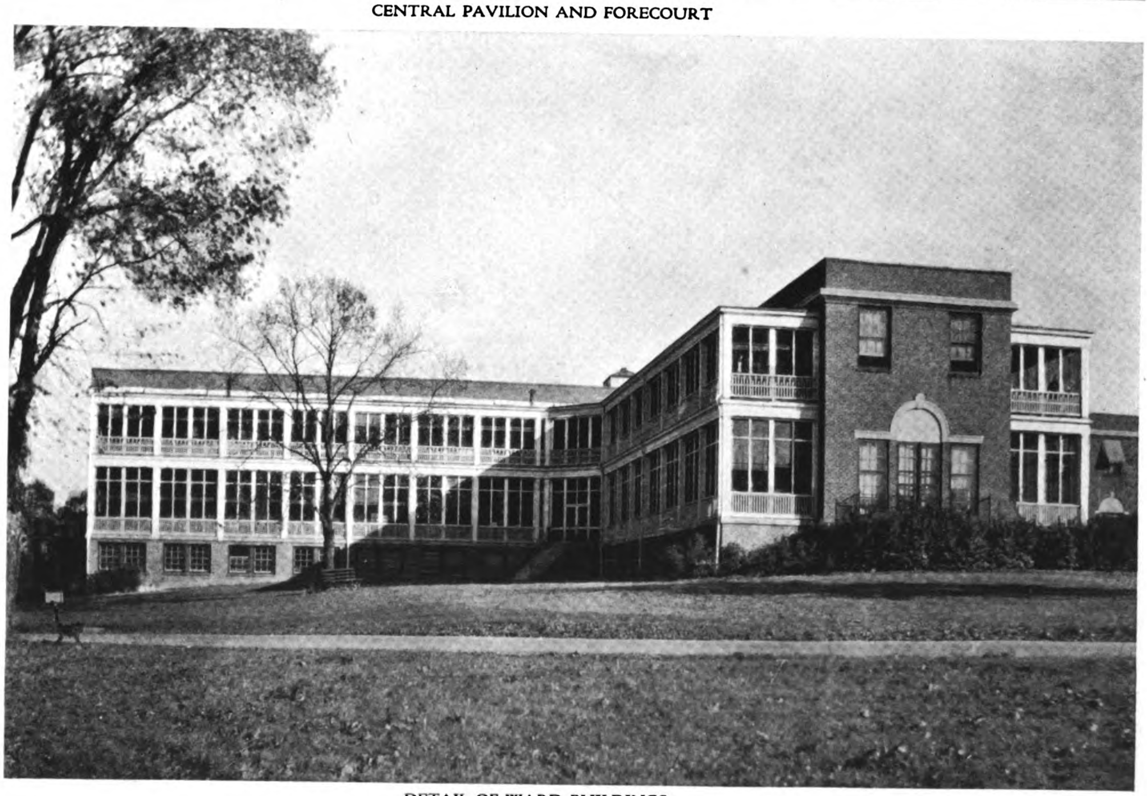
DETAIL OF INFIRMARY BUILDING

MUNICIPAL TUBERCULOSIS SANITARIUM FOR CITY OF DETROIT,
NORTHVILLE TOWNSHIP, WAYNE COUNTY, MICH.

STRATTON & SNYDER, ARCHITECTS



CENTRAL PAVILION AND FORECOURT



DETAIL OF WARD BUILDINGS

GRASSLANDS HOSPITAL, EAST VIEW, N. Y.

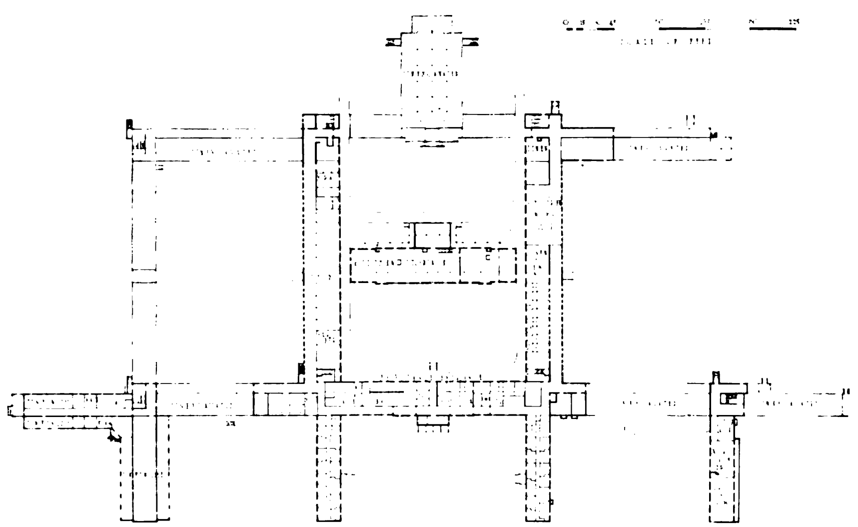
WALKER & GILLETTE, ARCHITECTS

GRASSLANDS HOSPITAL
EAST VIEW, N. Y.

Illustrations on Plates 104 and 105

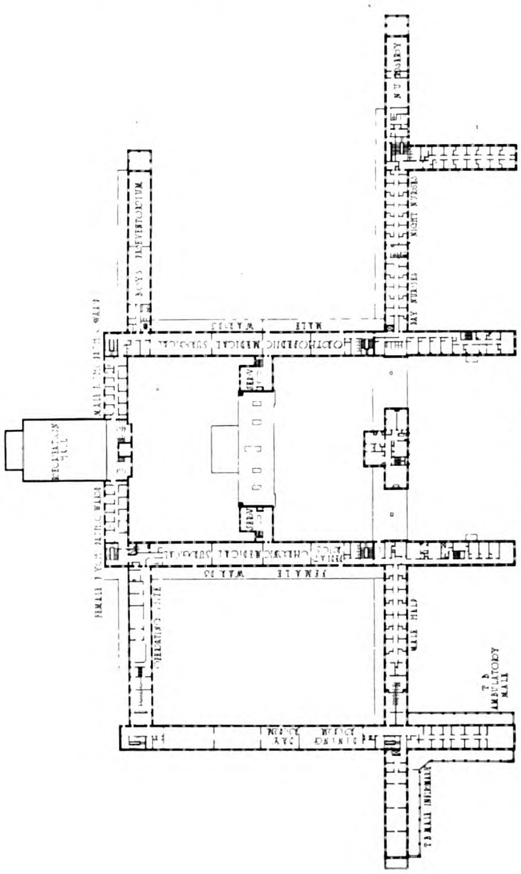
Type of construction. Fireproof
Exterior walls. Brick
Roofs. Slag
Floors. Concrete and linoleum
Heating. Hot water
Ventilation. Natural
Windows. Wood, double-hung
Date of general contract. 1917
Number of beds. 700
Cost of operating per day per bed. $55\frac{3}{5}$¢

This is a large county institution, caring for all types of diseased on a charitable basis.

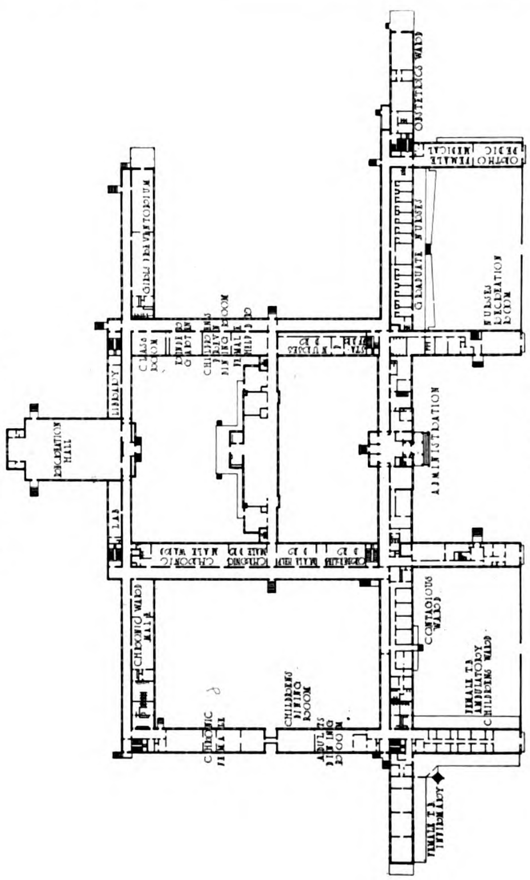


BASEMENT FLOOR PLAN

DETAIL OF ENTRANCE PORTICO



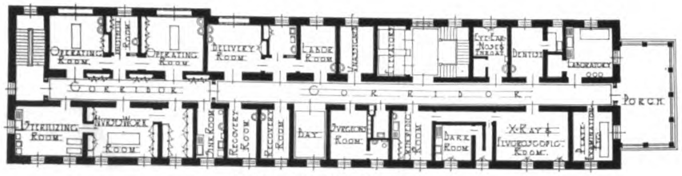
SECOND FLOOR PLAN



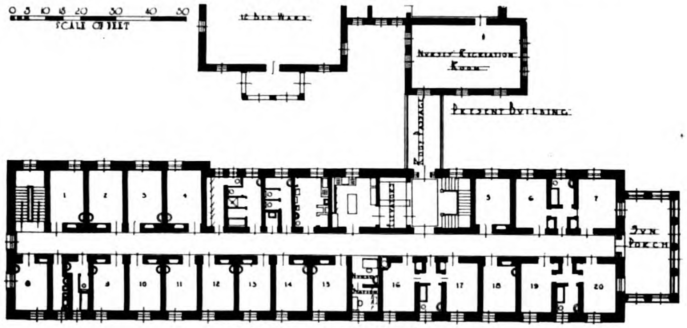
FIRST FLOOR PLAN

GRASSLANDS HOSPITAL, EAST VIEW, N. Y.

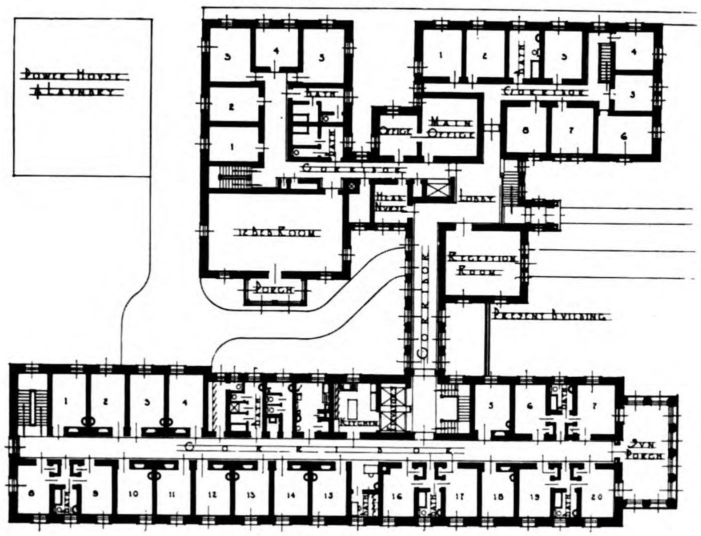
WALKER & GILLETTE, ARCHITECTS



SIXTH FLOOR PLAN



TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

GENERAL EXTERIOR VIEW

UNION HOSPITAL, TERRE HAUTE, IND.

JOHNSON, MILLER & MILLER, ARCHITECTS

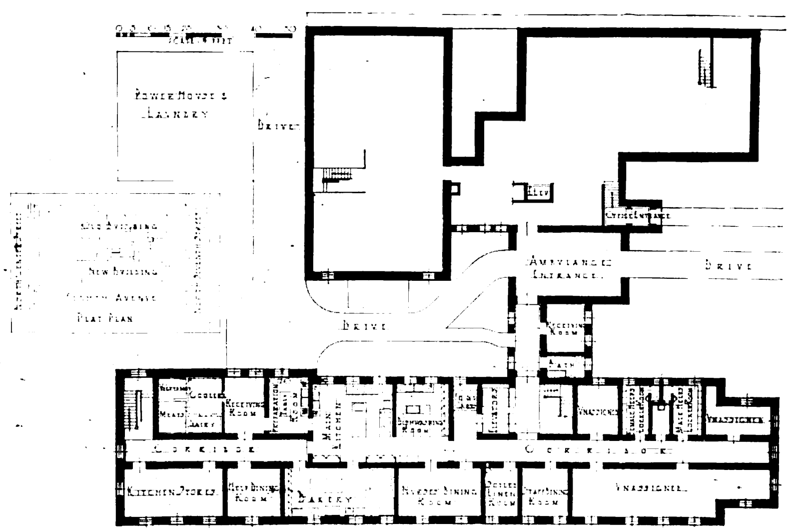
STRATTON & SNYDER, CONSULTING ARCHITECTS

UNION HOSPITAL
TERRE HAUTE, IND.

Illustrations on Plate 106

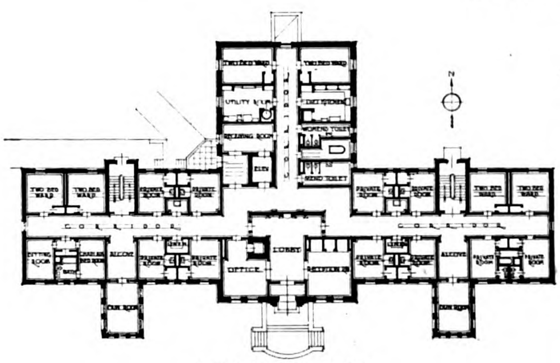
Type of construction. Fireproof
Exterior walls. Brick and stone
Roofs. Tar and gravel on concrete
Floors. Linoleum and concrete
Heating. Vacuum steam
Ventilation. Mechanical
Windows. Double-hung
Area of building. 6,786 sq. ft.
Cubage of building. 593,985 cu. ft.
Date of general contract. Dec., 1921
Cost of building proper. $350,000
Cost per cu. ft. 56.2¢
Number of beds. 100
Cubic ft. per patient. 5,940
Cost of operating per day per bed. $3.20

This construction includes the main kitchen and stores. Laundry, power plant and administration quarters in separate building.

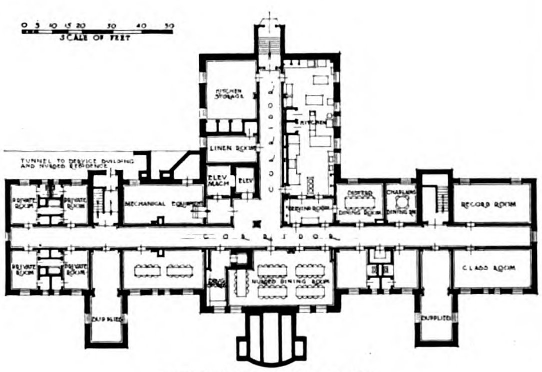


BASEMENT FLOOR PLAN

GENERAL EXTERIOR VIEW



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

DETAIL OF ENTRANCE FRONT

ST. JOSEPH'S HOSPITAL, MITCHELL, S. D.

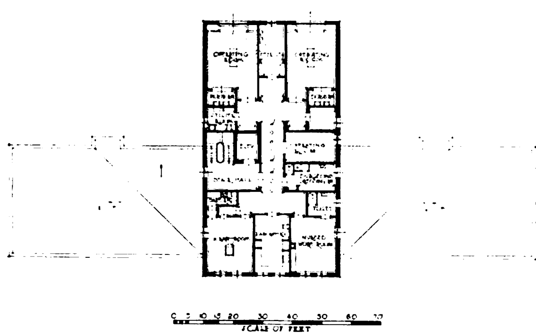
EDWIN H. LUNDIE, ARCHITECT

ST. JOSEPH'S HOSPITAL
MITCHELL, S. D.

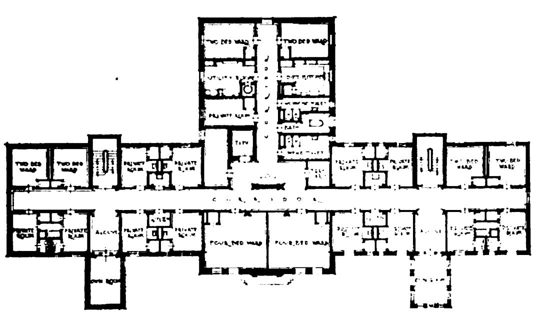
Illustrations on Plate 107

Type of construction. Reinforced concrete; clay tile and brick partitions
Exterior walls. Brick and limestone
Roofs. Reinforced concrete and gravel
Floors. Cement, tile and terrazzo
Heating. Vacuum steam
Ventilation. Exhaust in kitchen only
Windows. Double-hung wood sash; steel sash for operating room
Area of building. 9,488 sq. ft.
Cubage of building. 467,115 cu. ft.
Date of general contract. August, 1921
Cost of building proper. $212,721
Cost per cu. ft. 45½¢
Number of beds. 87
Cubic ft. per patient. 5,369
Cost of operating per day per bed. $2.50–$3.00

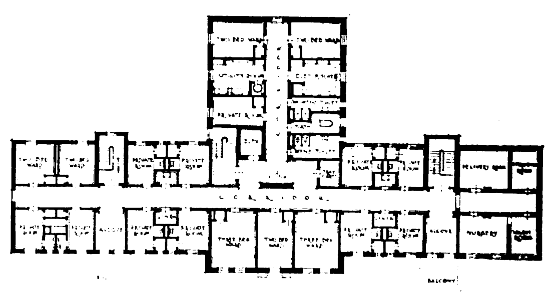
This construction includes main kitchen. Laundry, power plant and nurses' residence in separate buildings.



FOURTH FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

Hospital Refrigeration

By J. F. MUSSELMAN, M.E.
Consulting Engineer, New York

As hospital equipment of every kind has developed, improved and, to a certain extent, been standardized, the use of natural ice for refrigeration and water cooling is almost a thing of the past; so nearly so, in fact, that the plant of today must be on a very small scale or the conditions very unusual to justify the omission of some sort of a system of mechanical refrigeration.

Reasons are many for the abandonment of the use of ice, but the ever increasing avarice of the iceman probably had almost as much to do with it as the simplification and betterment of the mechanical refrigerating plant. Then again, the demand for lower temperatures in certain refrigerators than can be had with ice has become more persistent as the high cost of spoiled foodstuffs goes higher. Refrigerating machines in smaller sizes and with automatic devices to stop and start, as required to maintain a uniform box temperature, have made possible the use of mechanical refrigeration in plants and in individual buildings that would have been, until recently, too small to warrant use of anything but ice.

There are so many factors involved in the question of the advisability of installing a system of mechanical refrigeration for a hospital building or group of buildings that no hard and fixed rule can be laid down, but it may be said conservatively that for any hospital with a capacity of 50 or more beds, in which it is a question of either buying ice from some outside source or installing a mechanical refrigerating apparatus, it is advisable, at least from a standpoint of convenience, to use mechanical refrigeration. For so small a hospital as 50 beds, if electricity has to be bought at usual rates and with an operating force in the engineering department as indifferent and inefficient as is often found in the smaller institutions, the mechanical refrigerating plant will not be an economical investment, but at least it will be a genuinely popular luxury. The size of the plant required for a hospital of a given size will vary widely with conditions, but not materially with the climate. For average conditions, four tons of refrigerating capacity will be required per hundred beds to take care of the cooling, drinking water and ice.

Mechanical refrigeration is least advisable, of course, where a dependable source of pure natural ice exists in the immediate vicinity of the buildings. This involves an icehouse and a considerable amount of labor in handling, but it effects such a substantial saving in the operating cost of the institution that it is popular even though it be primitive. The use of natural ice at the price of the harvesting is advantageous, too, in the small boxes of isolated buildings too far removed from the service building to permit the circulation of brine.

Before discussing the comparative advantages of the different types of mechanical refrigerating systems, it is well to consider the question of how extensive the system should be; that is, whether it is better to pipe brine from the central plant to every individual box in every building or to use separate small refrigerating plants (what might be known as unit machines) in buildings and boxes located at a distance from the central plant. For a single small refrigerator box, widely removed from the central plant and from all other boxes, almost any expedient is better than pumping frigid brine through long lengths of hot pipe tunnel where it can trade heat with the steam and hot water piping. The extravagance of such a trade can be appreciated when the fact is considered that every heat unit absorbed by the brine mains costs at least five times as much to generate as the heat unit lost by the steam or the hot water mains, but to make matters worse, in this case, both the heat absorbed and the heat lost constitute a net loss.

The unit system of refrigeration eliminates the transmission losses and is thermostatically controlled, which considerably reduces another source of waste, that is, carrying the boxes too cold. For these reasons the unit system, in spite of the inherent inefficiency of miniature units, is more economical than any kind of a central system, if the boxes to be cooled are very much separated. But at the present state of development these refrigerating units are subject to criticism on two scores: first, they are likely to be objectionably noisy in the diet kitchens, especially if the diet kitchen is adjacent to a ward or private room; then they are, in spite of all claims to the contrary, so delicate in construction and adjustment as to require competent attention now and then and a considerable amount of repairs. But they are being improved steadily, and before long we may expect them to demand no more operating attention than an automatic dumbwaiter or the family washing machine.

For the central plants of hospitals, three distinct types of system have been widely used. Each has its champions and each has peculiar advantages for specific conditions. The ammonia compression system has been more widely used than any of the others, but a compression system using a refrigerant other than ammonia is gaining wide favor of late. The third, the ammonia absorption system, under some conditions shows greater economy than either of the others and is surely as simple and easily operated as a refrigerating machine can be made. The ammonia compression system has been used so widely and is understood so generally that it is usually first thought of when refrigeration is considered. This type of plant has been somewhat improved within the last few years by the addition

of an automatic feature designed to start and stop the compressor as the box temperatures require.

It is not considered safe to pipe the high pressure ammonia into the boxes, especially the boxes in the hospital proper, for the pressure is high, probably 160 pounds per square inch on the average, and however the piping is done, it sometimes bursts with disastrous results. For this reason, if for no other, it is customary to confine all of the ammonia piping and equipment to the central machinery room, which it is well to isolate from other parts of the building. With this system, in fact with any ammonia system, brine is used as a cooling medium. For a high building with refrigerators on the upper floors, supplying the power required to pump the brine becomes a matter of considerable expense if an open system of piping is used. For this reason the most economical results can be accomplished by completely separating the brine used for box refrigerating from that of the ice-making plant, in this way using a closed brine cooler and a closed system of piping. The only danger with this latter scheme is that of the brine's freezing and bursting the brine cooler if the pump should stop.

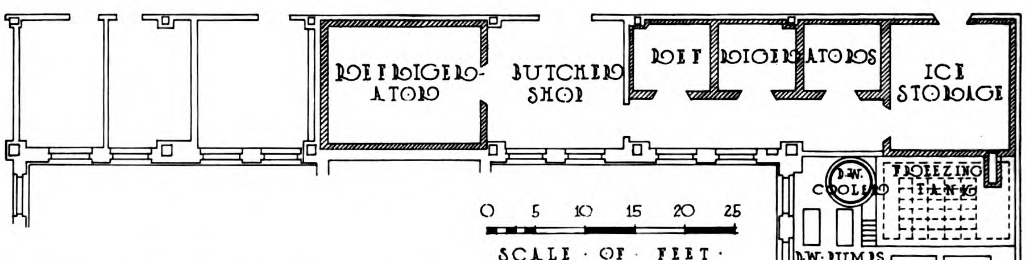
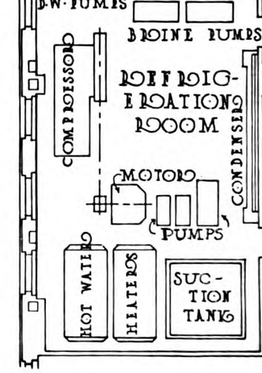
A compression system using a refrigerant less hazardous than ammonia obviates the necessity of separating the plant from the load and makes possible the use of direct expansion in the refrigerators without danger. A plant of this kind can be placed in the immediate vicinity of the main storage refrigerators without danger and with the minimum radiation loss from distribution piping. This point alone will often justify the selection of such a system. What is probably the best developed and most popular of the machines of this general type uses as a refrigerant carbon dioxide, the physical characteristics of which involve a tremendous head pressure, but which nevertheless is perfectly safe on account of the harmlessness of the gas.

The ammonia absorption system deserves wider use than it has had, on account of the high over-all operating efficiency that can be effected by its use in conjunction with steam-driven pumps operated against a high back pressure, of 10 pounds or so, with their exhaust used in the generator.

With a central system of refrigeration, use of a circulated system of frigid drinking water is certainly advisable in any hospital. An ice water faucet in every diet kitchen and utility room is a convenience that every nurse will regard as a labor-saver, to say nothing of increasing the possibility of patients' getting water which is less than lukewarm.

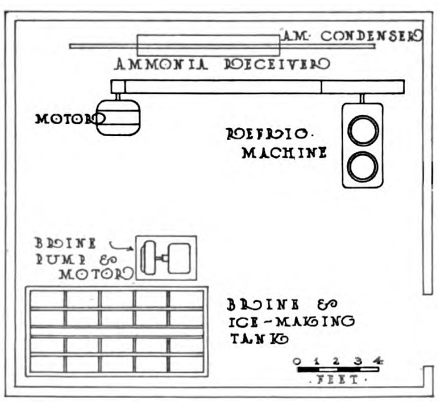
An ice-making plant is not necessarily a part of every hospital refrigerating plant, and if ice can be bought reasonably it is doubtful if a central freezing plant will be an economical investment for a hospital of less than 100-bed capacity.

A vital point in connection with installation of any refrigerating plant that is sometimes overlooked is the necessary space for brine pipes. These must be insulated and insulated well. A comparatively small brine pipe will be 7 inches in diameter with its covering on, and any limitation in space for such pipes involves not only a heat loss but a sweating of the pipes with all of its possibilities for damage. These pipes should be exposed if possible and readily renewed, as there is small possibility of brine pipes' lasting as long as the building does. It is also imperative that the brine and drinking water pipes be kept as far as possible away from steam and hot water pipes, and never run in the same furring or pipe shafts.

Plan of Refrigerator Rooms and Machinery Layout, Basement of Elizabeth General Hospital, Elizabeth, N. J. Capacity, 252 Beds.

Crow, Lewis & Wick, Architects
J. F. Musselman, Engineer



At Left, Plan of Refrigerator Machinery Room for Hospital of 200 Beds.

Hospital Construction and Costs

By EDWARD H. HOYT, A.I.A.
Haven & Hoyt, Architects, Boston

IN approaching a consideration of contemplated new hospital construction the question frequently arises as to whether it shall be of fireproof or of non-fireproof type. Very often committees and individuals, while recognizing the many advantages and great desirability of non-combustible accommodation, incline to use of the non-fireproof or possibly a semi-fireproof type, actuated by motives of economy and fear of the difficulties to be encountered in providing the requisite funds. Where conditions warrant one-story structures, wooden construction would appear to be permissible from the point of view of the safety of the occupants, but buildings of combustible type, even with masonry exterior walls, are generally not morally justified in excess of two stories in height.

Favorable initial cost, outside of consideration of the length of the construction period, would appear to be the sole argument in favor of non-fireproof hospital buildings, while the advantages with respect to maintenance costs are decidedly in favor of the fireproof type; there is the greater assurance of safety, and preservation of hospital facilities is substantially guaranteed.

If the materials for the interiors of fireproof buildings have been wisely chosen, the cost of renewals and repairs and of the general upkeep is reduced to a minimum, and if the designer has investigated and met the detailed requirements of insurance interests, very favorable premiums are obtained. On the other hand, non-fireproof buildings for hospital occupancy deteriorate very rapidly in spite of good intentions with respect to care, and insurance premiums obviously are always bound to be high.

In some instances hospitals are so arranged that the patients are housed in fireproof structures, and other buildings of the group are of poorer type, possibly protected with sprinkler or other equipment, but the strength of a chain is measured by its weakest link, and the same truths that apply to other purchases seem applicable to hospital buildings, the best being usually deemed the cheapest eventually. Another point of importance is the selling value of safe construction to the public seeking hospital accommodations, for a lack of patronage, particularly for the higher grade income-earning space, is quite as disastrous for a hospital organization as for any other business, and the managements of such institutions, to be successful, must recognize business principles, or the quite frequent annual deficit is bound to be greatly increased.

With respect to the selection of materials for hospital construction there is not much to be said in connection with non-fireproof buildings since, for financial reasons, the usual methods, analogous to those of dwelling house construction, are generally adopted. It is of minor importance whether the wooden construction is covered externally with brick veneer, stucco, wood or other inexpensive material. If the exterior hazard is by chance reduced, it is simply a question of degree, and that of the interior will still exist, and from the nature of conditions a general deterioration is at once well under way.

The materials required for fireproof hospital construction, generally speaking, are the same as those used in buildings of that type designed for occupancy of different character, and are to be had in no inconsiderable variety, the selection for the various uses depending upon choice, permanency, availability, distance from source of supply, and other obvious considerations. The necessity for the use of money to extend the greater usefulness and efficiency of an institution appears to preclude other than buildings of simple design and substantial construction, over-ornate buildings finding no justification, due to their unwarranted extravagance and the generally ensuing lack of funds to provide for their maintenance. Among many of the groups, the functioning of which is most widely commended, are to be found buildings with handsome, well selected brick exteriors with restrained use of stone or other suitable trimmings, the floors and roofs of which are of concrete or other standardized construction and with interior walls and partitions of terra cotta or other masonry or the equivalent.

The term "semi-fireproof construction" appears to have received no standardization, but to have resulted from influences frequently exerted to secure economies in cost of construction, and the term would suggest a use of certain combustible materials at unimportant points in structures otherwise non-combustible. Such expediencies as the use of fireproof floors, but with wood stud dividing partitions, or the dividing of a combustible building into zones with masonry walls, are examples of what could be done in this respect. In such instances, however, staircases should be fireproof or at least contained in fireproof enclosures.

In Massachusetts there is at least one instance where a protected mill frame, wood roof construction, on an otherwise first class, fireproof building, was accepted as the equivalent of fireproof construction by insurance interests and the local inspection authorities. In this case the roof was protected with slate exterior surfacing, and the wood was fireproofed on the inside with metal lath and cement mortar 1 inch thick, so applied as to leave no air spaces. Wood construction afforded the best possible nailing for the slate, and in the opinion of the writer such construction need not be considered as inferior for pitched roofs. It could not, with any assurance of safety, be used, however, on flat roofs,

and suspended internal protection on the under side of rafters, leaving air flues, should be considered as decidedly inferior, and of no benefit with respect to decreasing the amount of insurance premiums.

From the standpoint of consideration of interior trim for hospital buildings, it is not generally understood that the term "fireproof" would mean that the trim could not be of wood, either in whole or in part. It is probably safe to say that in most instances wood trim, doors and window construction would be found. The modern use of terrazzo, mosaic or other similar floor surfacing naturally and obviously precludes the use of wood bases in connection therewith for sanitary and other reasons.

Since the title of this article refers to costs, and since the foregoing observations treat of types of construction rather than types of plan, it should be said that the layout of an institution has a distinct bearing on its cost, depending on whether it is of a block type, pavilion, cottage or composite type. Other considerations being equal, the block type may be considered financially more favorable for several reasons, among them, in that the percentage of enclosing walls is smaller than in instances where there are many detached units. When the latter type is selected it is for the sake of definite advantages that appear to warrant the added expenditure.

Since there is no actual standardization of hospital layouts, obviously difficulties are encountered in attempting to give definite guides to hospital construction costs, because of the great variation of standards, the ever-present influence of local conditions, and the vast difference of demand for built-in laboratory and other equipment for treatment and research purposes.

The antiquated method of measuring hospital construction cost by the unit cost per bed is illogical and is often attended with danger, since the comprehensive, complete institution suffers by comparison with one affording but limited accommodations and service. Such comparisons are constantly being made when knowledge of conditions is lacking, and cost comparisons are too often made without full knowledge of conditions as to type of construction, scope of facilities, or as to whether heating and other services are from outside plant or otherwise.

The fact that no standard height of hospital building has been established, and the fact that materials and finishes greatly vary, appear to prove the square foot unit cost as being of no material value in arriving at construction costs. The unit costs per cubic foot, however, based on known conditions with respect to existing buildings, would appear to be a safe method of arriving at an approximate cost of the various types, proper allowance being made for variations due to local conditions of site, market conditions and equipment.

If a cubic foot unit cost is to be of value, consideration may well be given to a reduction of the cubic volume, and centralization in many respects may be cited as a possible aid to such accomplishment. Much can be achieved in this respect by proper attention to provision for centralizing food distribution, arrangement of sterilization, care of patients' clothing and by care in avoiding other unnecessary duplication. Particular consideration of centralization has been given in the planning of the new Fifth Avenue Hospital in New York, with the apparent result of a considerable increase in the space available for patients. Outside of construction cost, it is hoped that this institution, arranged throughout with private rooms, may show results comparing favorably with open ward plants, where a similar cubic volume per patient is provided. The operation of this plant will be watched with interest.

As an example of the value of the cubic foot unit method of reasoning, a survey of some ten hospitals recently built indicates that an allowance of from 7,000 to 8,000 cubic feet per bed should provide for the full requirements of an average, general hospital, exclusive of the housing of nurses, and the same survey indicates that an additional allowance of slightly over 4,000 cubic feet should provide for this.

A further survey appears to disclose other interesting facts regarding some 50 institutions of fireproof construction, of various types of design:

General hospitals of about 100-bed capacity, situated away from the larger centers of population and supplied with the minimum of laboratory, operating, and plumbing equipment, average in cost 48 cents per cubic foot.

General hospitals ranging in capacity from 100 to 250 beds, fully representative of good modern practice in planning, construction and equipment, average in cost 57 cents.

Large hospitals in metropolitan centers, with a large proportion of private rooms and very fully equipped for medical and surgical research and of the best type of construction, average 75 cents.

Institutional buildings, chiefly for the care of the aged and invalids, and with no operating rooms and with the minimum of administration and medical treatment space, average in cost 42 cents.

Additions to hospitals, in which heating, laundry, kitchen and similar services are supplied from existing buildings, average in cost for mixed ward and private room pavilions 50 cents.

Nurses' homes with suitable public rooms, training schools, and adequate plumbing facilities average in cost 52 cents.

These figures are based on contracts made during 1921 and 1922, and they do not include costs of hospital equipment and furnishing.

In conclusion, it would appear that a low construction cost does not necessarily mean the highest efficiency. There are three important elements involved; namely, construction cost, operating cost, and maintenance cost. The highest degree of success would appear to be shown by the best all around functioning of the plant, the cubic volume of which results in an economical construction cost without sacrifice of the facilities of the plan providing for reasonable operating cost, or of use of the materials which insure low maintenance charges.

The Housing of Staff and Employes

By OLOF Z. CERVIN
Cervin & Horn, Architects, Rock Island, Ill.

A PROBLEM is well on the way toward solution if all its limiting conditions can be stated, and when a nurses' home is being considered surely the most important would be the number and character of the staff and employes.

As a concrete illustration a mid-western hospital with a capacity of 140 beds has been selected. The list of employes furnished by the superintendent is quite formidable, and includes:

1 superintendent.	8 house maids.
1 assistant.	3 cooks and assistants.
1 head nurse.	2 dining room maids.
1 instructor.	2 scrub women.
3 floor nurses.	4 laundry women.
1 dietitian.	1 engineer.
1 operating room nurse.	1 janitor
60 undergraduate nurses.	1 laundry man.
15 special nurses.	1 fireman.
6 internes.	1 houseman.

1 orderly.

Two solutions are given of a nurses' home. Figs. 1, 2 and 3 show a recently completed motherhouse for 50 sisters, which is really a nurses' home, excepting that the sisters are of a more advanced age and live their mature lives in the home instead of a few years while training.

The first floor plan shows a large combination living room and library, with a connecting porch and a commodious dining room, all of which rooms can be thrown together for special occasions. Adjoining the kitchen is a room where the nurses and staff with their guests drop in every afternoon between three and four o'clock for a cup of tea. There are two classrooms which can be thrown together and used for large classes and for devotional purposes. The second floor plan shows the typical single bedrooms, each with an unusually large closet. The closet arrangement is quite suitable for a home of this kind, but a better arrangement will be shown later when discussing the next plan. On this second floor is a large room for the sister superior and a smaller one for her assistant, with a private bath between. The sister superior's room has a disappearing bed, which, however, is not quite so good as to plan a suite, a living room and separate bedroom. Two rooms will be noted as forming a suite, the one a living room and the other a bedroom with two beds. A further development of this combination will be shown later. An important feature of this second floor is the sewing room, well equipped with electric plugs, ironing boards, a wide and long table, a wall case, and two spacious closets for linen. A door leads to the porch roof. The number of fixtures in the general bath and toilets are the very minimum, and a good rule is for each 18 nurses:

2 bath tubs.	3 stools.
1 shower.	5 wash basins.

1 dental lavatory.

The basement contains a small laundry, a feature which should not be overlooked as supplementing the large general laundry, the nurses requiring a place to do up those pieces which are needed in a hurry or which must not be sent to the main laundry.

A large nurses' home of six stories and basement with capacity of 134 beds is illustrated in Figs. 4, 5 and 6 (a preliminary study for building upon a peculiarly shaped lot), which has several important features not provided in the motherhouse. Among them may be noted in the basement a large gymnasium 13 feet high, a locker room, a storage room, a swimming pool and showers.

The recreational facilities for the nurses should receive careful attention and should include, besides a gymnasium and pool, a social

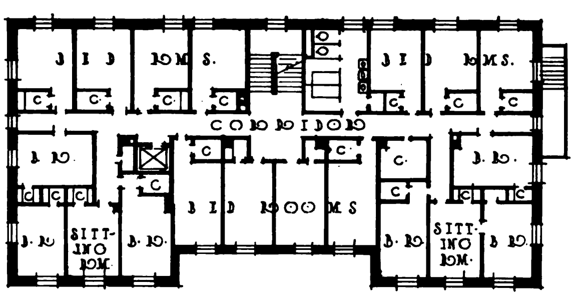


Fig. 3. Third Floor Plan

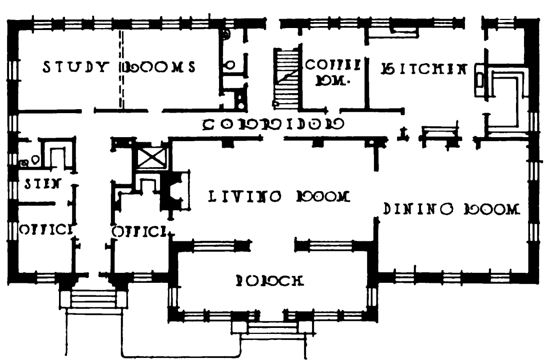


Fig. 1. First Floor Plan

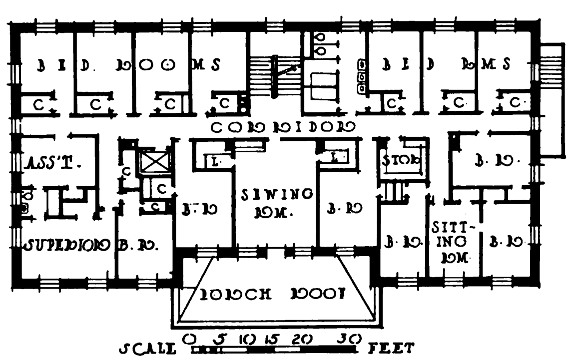
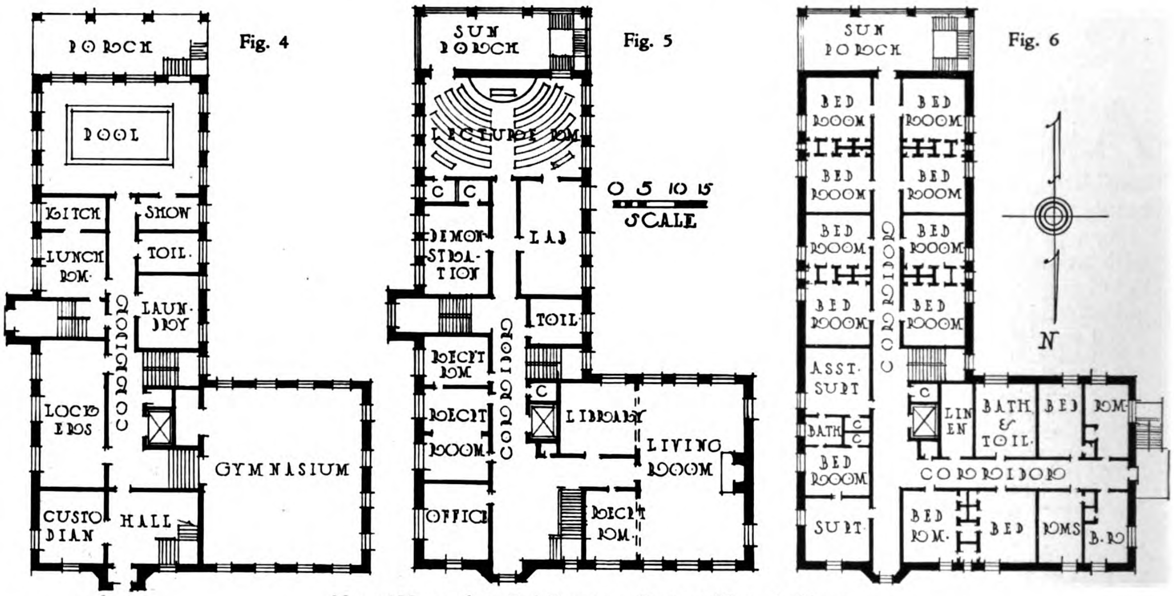


Fig. 2. Second Floor Plan

Motherhouse, Immanuel Deaconess Institute, Omaha
Cervin & Horn, Architects



Nurses' Home of 134-Bed Capacity. Cervin & Horn, Architects

or living room, a library, tennis courts either on the ground or on the roof, and if possible a garden and a sun porch for each story. Owing to the first cost and the subsequent upkeep of the swimming pool it is quite likely that few nurses' homes can afford this feature, but all other mentioned facilities should be included.

The living room is the one room of the home which will have most to do with keeping the nurses contented. The architect should avoid making this room formal, with stiff pilasters and cornices and an excessive ceiling height. The furniture and the decorations should be selected for livableness. Here, too, there will be dancing, and the floor should be finished accordingly. To the recreational features belong the kitchenette with a small lunch room for use with the informal parties of the nurses.

The educational features include a large lecture room, a laboratory for chemistry and biology, a demonstration room with beds and dummies, and storerooms. The lecture room should be provided liberally with blackboards. Back of the instructor the blackboard should be double, one portion sliding up for work which is to be maintained for any length of time. The laboratory should have 10 or 12 feet of blackboard. In the lecture room there should be cupboards, or a small room should be provided for storage of apparatus. An instructor's room would have been added if space had permitted. Outlet for a stereopticon should be provided in the lecture room, and it would be well to make provision also for a motion picture machine.

The important unit of the nurses' home is the bedroom. The arrangement in the motherhouse with a large closet at the entrance is uneconomical, producing a small hallway, which though adding to the privacy and desirability of the sister's room is in an ordinary nurses' home not essential. A better plan is shown in Fig. 7, where wardrobes are so arranged that no space whatever is lost, the small alcove serving as a recess for the dresser. Incidentally, it is to be regretted that so many nurses' homes are arranged with the beds in the front portion of the rooms next to the windows, making it impossible to keep these pleasant parts of the rooms attractive for lounging purposes and when reading or studying, although it is true that ventilation is somewhat better with the beds near the windows.

There is considerable disagreement as to whether the nurses prefer single rooms or for sociability would rather be two in a room. It is probably best to provide at least 20 per cent single rooms and to have the rest two in a room for economy's sake.

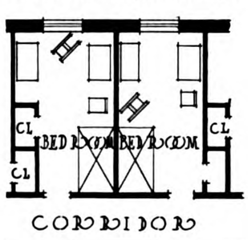


Fig. 7

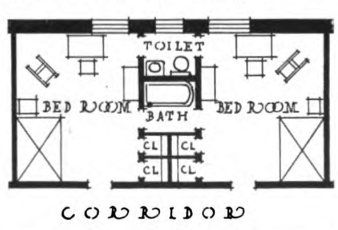


Fig. 8

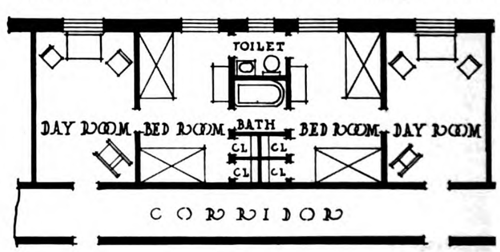


Fig. 9

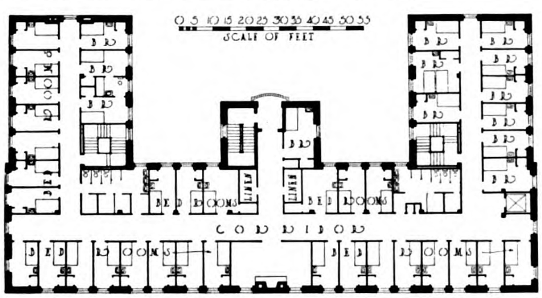
(Continued on page 308)

Nurses' Home of St. Agnes' Hospital, Philadelphia

FRANK R. WATSON, ARCHITECT

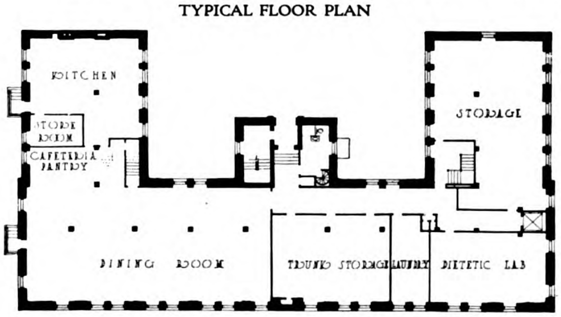
GENERAL VIEW OF EXTERIOR

THIS building accommodates 125 nurses. Construction is fireproof. Built January, 1921; cubage 596,505 cubic feet. Cost $322,112, or 54 cents per cubic foot. Contains kitchen and laundry for the nurses, heating from central power house.

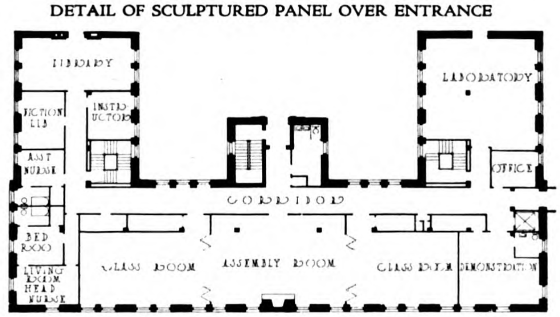


TYPICAL FLOOR PLAN

DETAIL OF SCULPTURED PANEL OVER ENTRANCE



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

The single rooms should be close to the toilets. The arrangement shown in the nurses' home, Figs. 4, 5 and 6, with toilets between two rooms and a separate closet for each nurse, has been found very acceptable. The bath tubs and showers are arranged to be used in common. Fig. 8 is from a lately finished nurses' home in Chicago, which is unusually good and of a fine type adopted only too rarely. The nurses will appreciate the added comfort of the private bathrooms.

A further development shown in Fig. 9, which might be called a *de luxe* treatment, provides a sitting room 10 x 15 for two nurses, with an adjoining bedroom 9 x 15 having a separate closet for each nurse and toilet and bath placed between two suites and used by four nurses. The great advantage of this plan is in freeing the sitting rooms of beds and having the bedrooms so arranged that the windows can be left wide open throughout the year without chilling the sitting rooms which can thus be used for dressing rooms with no danger of freezing the plumbing.

In addition to the standard nurses' rooms, special provision must be made for the superintendent and, if the building is large, for the house-mother. Each should have a living room, bedroom and private bath. The assistant superintendent, the head nurse, dietitian and the floor nurses, the instructor and the operating room nurse should each have special accommodations consisting of an individual bedroom with a private bathroom between two rooms. Again, these graduate nurses could well be given a separate wing in the build ng to themselves with individual rooms, general bath and toilets for their own use and a commodious living room in common.

It is important to provide sleeping accommodations for the night nurses, as they will require as much freedom from noise as possible and plenty of air with the daylight excluded. Several homes have commodious dormitories in the attics or on the roofs for these night nurses. Toilet accommodations should not be overlooked.

Each floor of the nurses' home should have a large linen store closet and one or two telephone booths with light, fans, pencils and pads. The special nurses must also be taken care of. They should be given, according to their number, dressing rooms and lockers and rest rooms with toilets. It is often found desirable to provide this accommodation in the hospital itself rather than in the nurses' home.

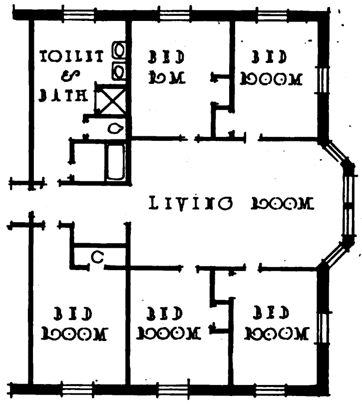


Fig. 10. Plan of Living Quarters for Five Internes

Fig. 10 illustrates a treatment of the internes' quarters. A large living room with bay window and space for billiard table, an individual bedroom and closet for each of five physicians, liberal toilet facilities, and an entrance hall with recess for hats and coats make a comfortable arrangement which would help to get and hold internes in these days of scarcity. The housing of the general employes and domestics is, as will be seen from the list at the beginning of this article, no trifling matter, if the hospital contains 100 or more beds.

Owing to the difference in their previous training and surroundings it is not necessary to plan as elaborately for the general employes and domestics as for the nurses, although of course if the funds permit it will add to their satisfaction and peace of mind if a common living room is provided for each sex, with some recreational features. The rooms should be individual, even if quite small. For a 40- or 50-bed hospital it is quite sufficient to provide one room for the janitor and one for the fireman, one room for a cook and one for a maid, and depend on outside help for scrubbing and cleaning. If the hospital is built on a hillside the basement, provided it is well out of the ground, can be used for many of the employes with the sexes well separated and if possible in opposite wings, completely equipped with toilets and baths. One small apartment for the head janitor and his family would be found acceptable.

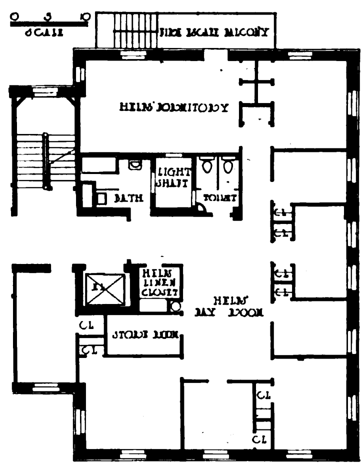
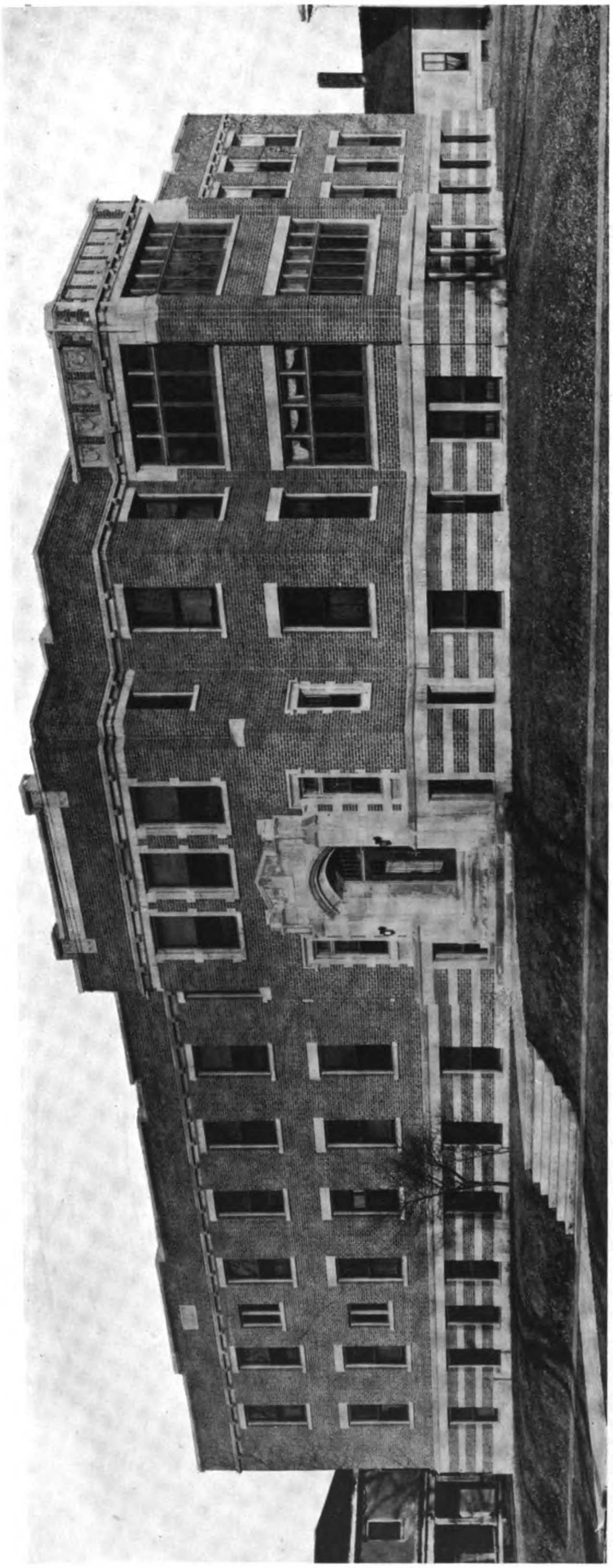
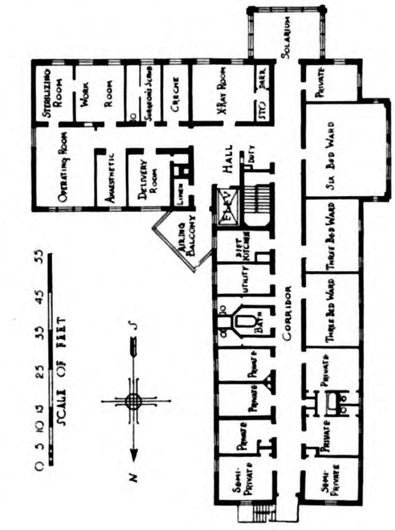


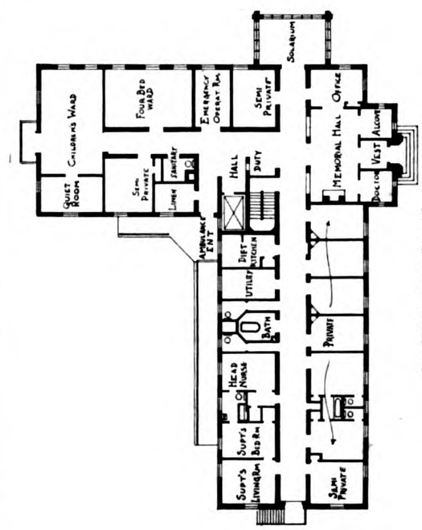
Fig. 11. Plan of Section Closed with Double Doors for Help's Quarters, Providing a Total Accommodation for 22 People

Fig. 11 illustrates one solution of the housing of the help in a portion of the building entirely closed off with double doors, but close to one of the stairways and the elevator. The plan provides for a large day room, skylighted, and surrounded by the various bedrooms of which there are two single rooms, two rooms for two, two rooms for three, one room for four, and a dormitory for six. There is in this self-contained unit a bathroom with a laundry tray and a toilet in a separate room; also a large linen room and a storeroom for trunks.

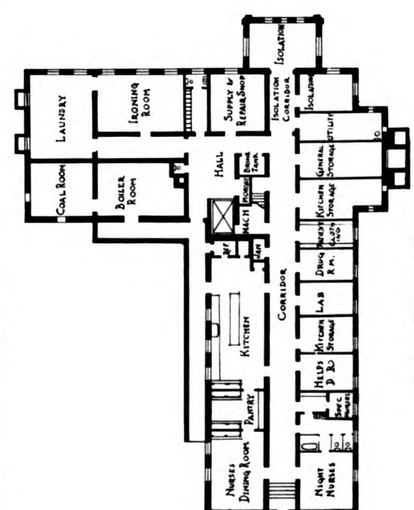




SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

MARY FRANCES SKIFF HOSPITAL, NEWTON, IA.

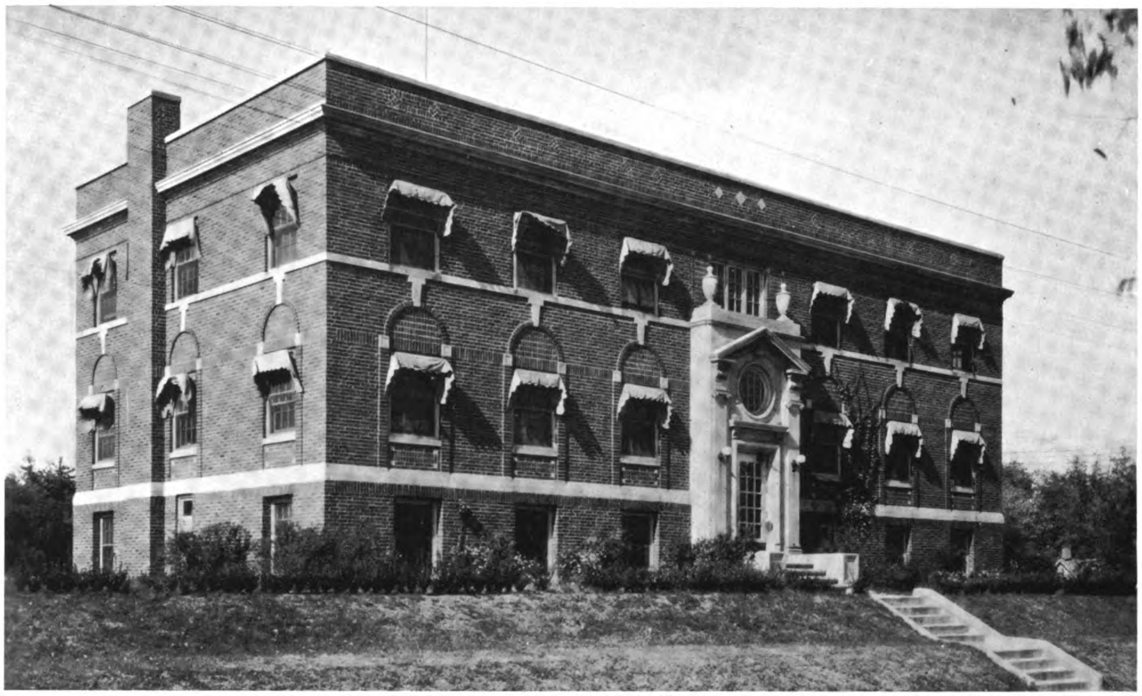
CERVIN & HORN, ARCHITECTS

MARY FRANCES SKIFF HOSPITAL
NEWTON, IA.

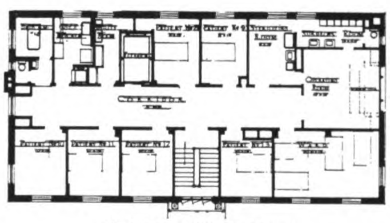
Illustrations on Plate 108

Type of construction. Fireproof
Exterior walls. Brick
Roofs. Terrazzo
Floors. Terrazzo
Heating. Vapor
Ventilation. Exhaust in kitchen and toilets
Windows. Wood, double-hung
Area of building. 7,116 sq. ft.
Cubage of building. 253,000 cu. ft.
Date of general contract. March, 1921
Cost of building proper. $142,000
Cost per cu. ft. 56¢
Number of beds. 50
Cubic ft. per patient. 5,060
Cost of operating per day per bed. $3.42

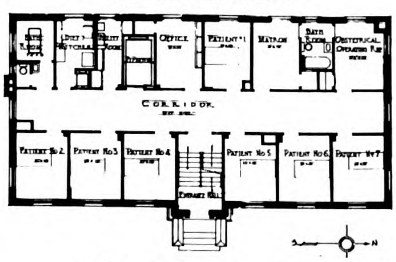
This construction includes kitchen, laundry and boiler room.



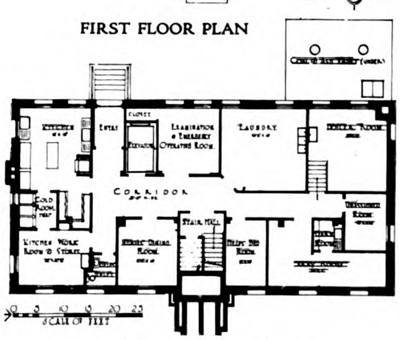
GENERAL EXTERIOR VIEW



SECOND FLOOR PLAN



FIRST FLOOR PLAN



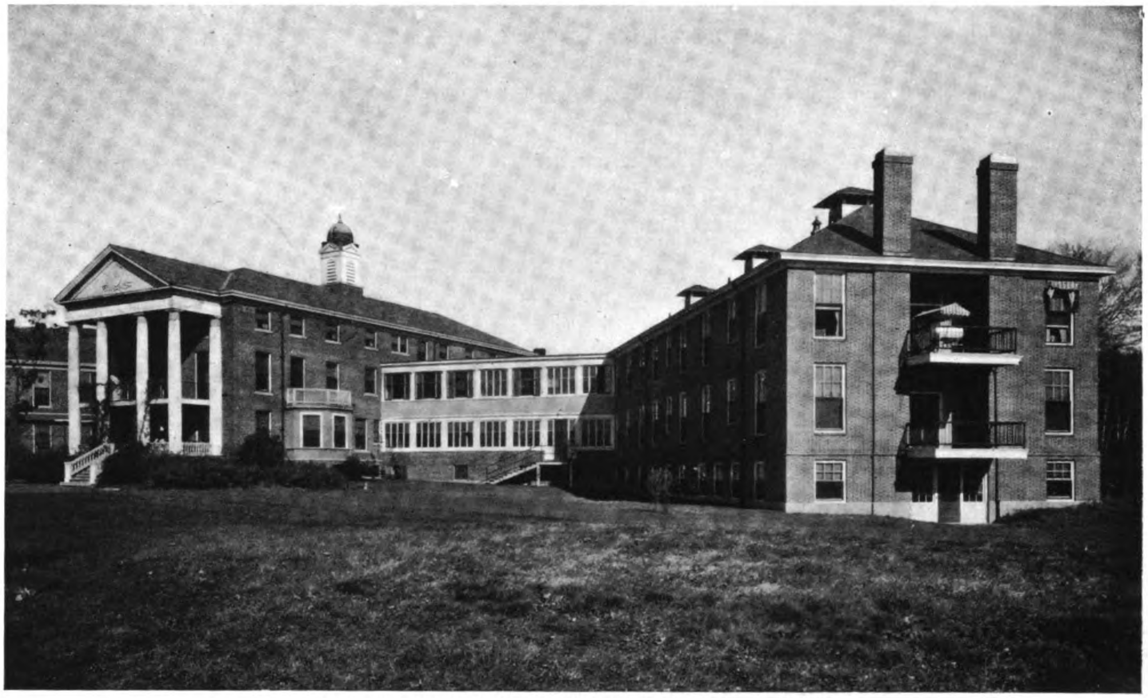
BASEMENT FLOOR PLAN

DETAIL OF ENTRANCE

PEKIN PUBLIC HOSPITAL, PEKIN, ILL

HEWITT & EMERSON, ARCHITECTS

Fireproof construction, Built 1917, Cubage 91,206 ft., Cost $40,000, Cost per cu. ft. .438, 18 beds, Cubage per patient 5067 ft., Complete individual building



GENERAL VIEW SHOWING MAIN BUILDING AT THE LEFT

DETAIL OF NEW WARD BUILDING

PRIVATE WARD BUILDING, ADDITIONS TO BEVERLY HOSPITAL, BEVERLY, MASS.

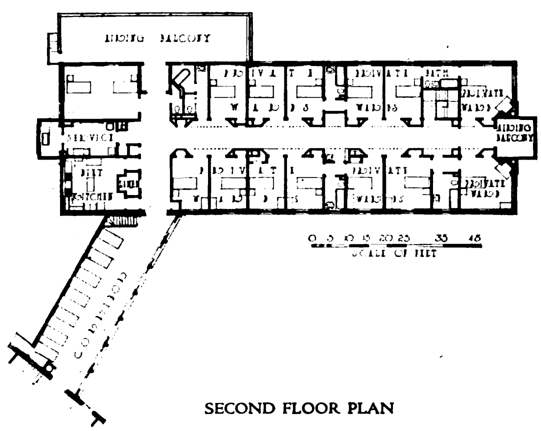
HAVEN & HOYT, ARCHITECTS

ADDITION TO BEVERLY HOSPITAL
BEVERLY, MASS.

Illustrations on Plate 110

Type of construction. Second class
Exterior walls. Brick
Roofs. Slate
Floors. Wood
Heating. Direct steam
Ventilation. Gravity
Windows. Wood, double-hung
Area of building. 6,200 sq. ft.
Cubage of building (including connecting corridor to administration building). 232,931 cu. ft.
Date of general contract. April, 1921
Cost of building proper. $101,675
Cost per cu. ft. 43½¢
Number of beds. 40
Cubic ft. per patient. 5,823
Cost of operating per day per bed. $6.34

This is a private ward building, part of a hospital already in operation. Laundry, kitchen and power plant service from existing buildings. Special features of the plan are the stepped airing balconies and the splayed door jambs giving a reduction in corridor space.



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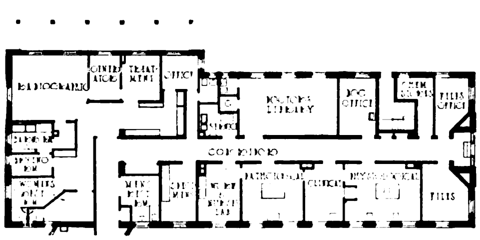
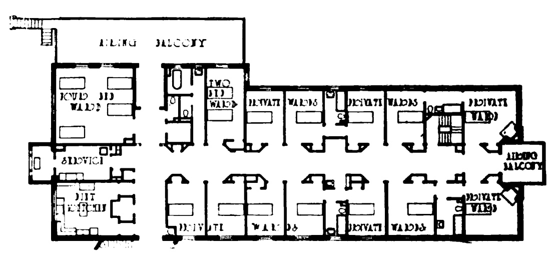
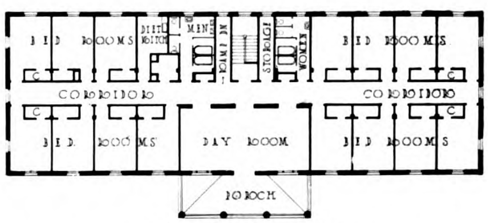


BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

GENERAL EXTERIOR VIEW



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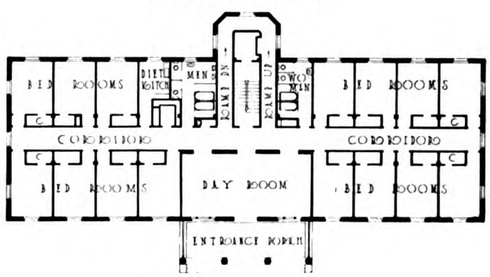

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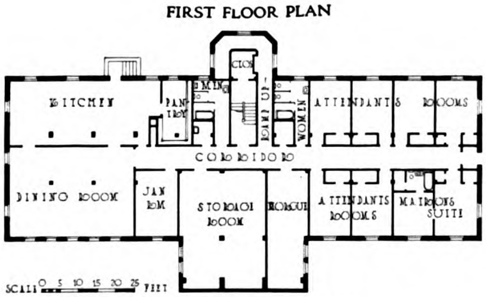


BASEMENT FLOOR PLAN

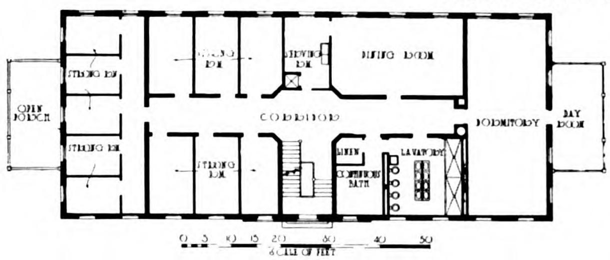
DETAIL OF PORTICO

HOSPITAL, SOLDIERS AND SAILORS HOME, MILFORD, NEB.

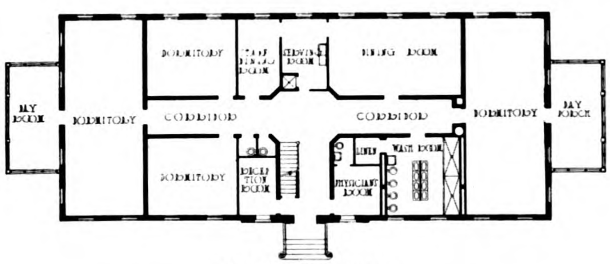
DAVIS & WILSON, ARCHITECTS

Fireproof construction, Built 1921, Cubage 214,228 ft., Cost $80,897, Cost per cu. ft. .37¾,
60 beds, Cubage per patient 3570 ft., Operated as part of large plant

GENERAL EXTERIOR VIEW



SECOND FLOOR PLAN



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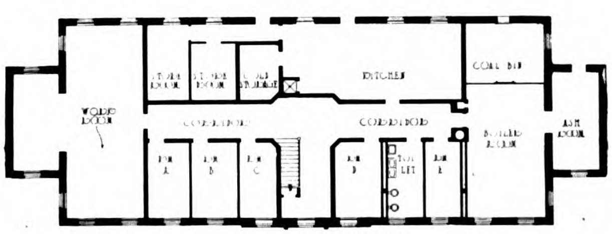


BASEMENT FLOOR PLAN

DETAIL OF ENTRANCE

PSYCHOPATHIC HOSPITAL FOR CRIMINALS, SPRING GROVE, MD.

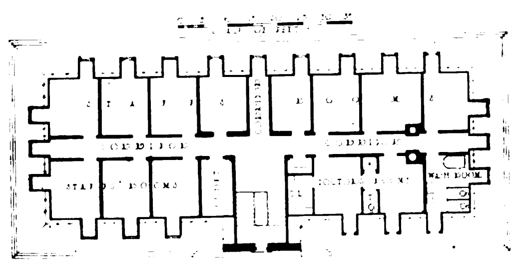
HENRY P. HOPKINS, ARCHITECT

PSYCHOPATHIC HOSPITAL FOR CRIMINALS
SPRING GROVE, MD.

Illustrations on Plate 112

Type of construction. Semi-fireproof
Exterior walls. Brick
Roofs. Slate
Floors. Concrete, hardened surface
Heating. Vapor, steam
Ventilation. Gravity
Windows. Wood, double-hung
Area of building. 4,116 sq. ft.
Cubage of building. 172,872 cu. ft.
Date of general contract. June, 1921
Cost of building proper. $90,000
Cost per cu. ft. 51¢
Number of beds. 90
Cubic ft. per patient. 1,921

This construction includes kitchen and boiler room. Laundry provided by outside service.

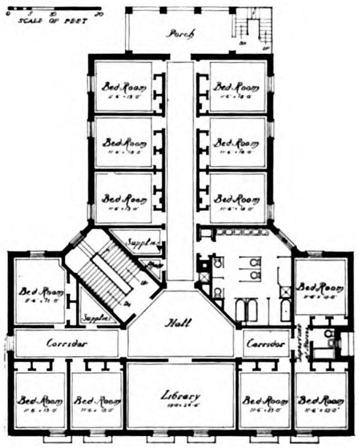


THIRD FLOOR PLAN

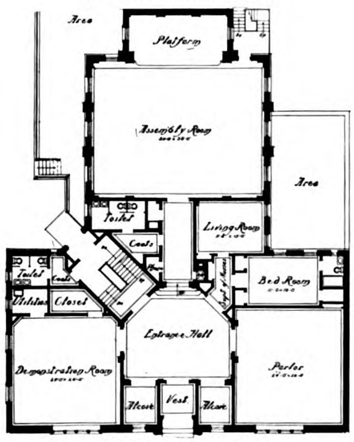
Nurses' Home, St. John's Hospital, Long Island City, N.Y.

ROBERT J. REILY, ARCHITECT

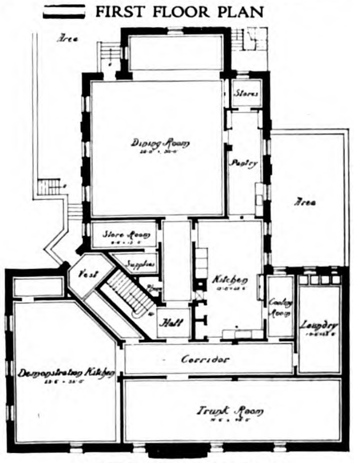
PUBLIC departments are well separated from nurses' quarters. The assembly room seats 200; the building accommodates 75 nurses. Cost $142,420, or 42.4 cts. per cu. ft. Built in 1921.



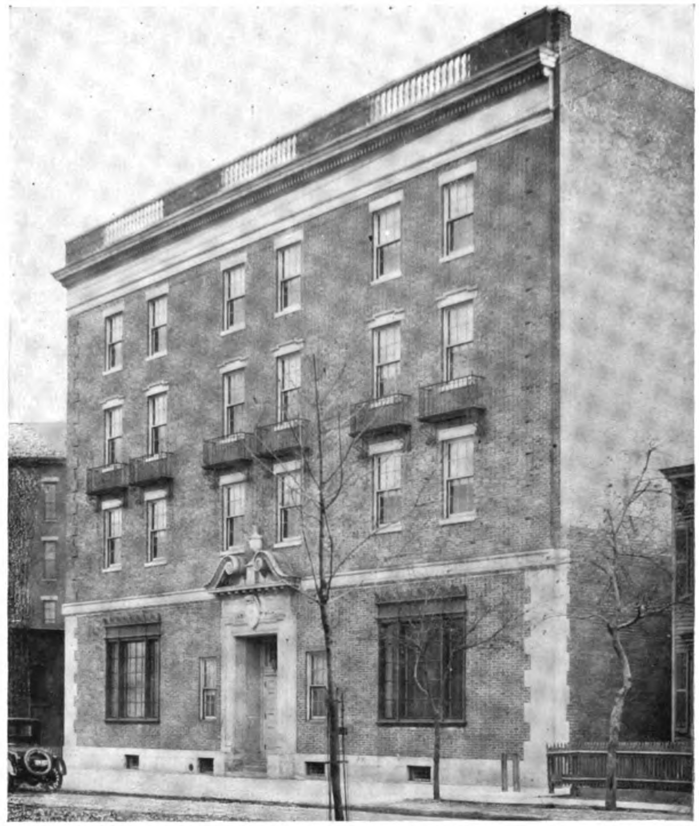
SECOND FLOOR PLAN



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN



GENERAL VIEW OF FACADE

DETAIL OF ENTRANCE

The Architectural Forum

Planning the Small Community Hospital

By CARL A. ERIKSON
of Richard E. Schmidt, Garden & Martin, Architects, Chicago

DEFINITIONS are not a delightful introduction. They are dry and uninteresting and, unlike a dictionary definition, they are without the lure of discovery which lies within Webster's Unabridged. At the risk of starting off on the wrong foot it seems desirable to explain the limits of this article.

"Planning" is used advisedly, as it is not intended to discuss the detailed requirements of each department, nor of hospitals in general. "Small" is a purely relative term in this case, indicating hospitals of less than 25 beds. The "community" may be represented by a village, town or other self-contained group of people, or it may be a suburban village dependent on a larger city. The hospital will be "general," one of the type accepting cases which would fall within the province of the larger "general" hospital. A hospital may best be defined by its purpose which is "care of the sick and injured; to provide training for nurses, dietitians, administrative officers, laboratory technicians, and internes; to encourage and support research in medicine and to prevent illness." This is the goal. If the hospital of less than 25 beds falls short, it is not only because of the limitations inherent in its size, but because of financial limitations as well.

The importance of the topic needs only a few statistics. There are 4,307 hospitals of under 40 beds (probably 3,000 of these are under 25 beds), and only 1,388 of more than 100 beds. There are 2,474 hospitals in cities of less than 10,000 population.

There is a quite evident relationship between the economic and social status of an individual as a member of the community and his quarters as a patient. If the hospital is "of, by and for the people" it must serve both the banker and the baker. Low priced or free accommodations must be paralleled by quarters for those who can pay well, but caste lines are not as rigid as in the larger cities. While the baker might not be comfortable in a bed alongside the banker, both seem to do quite well in adjoining rooms. The number of beds for each class will, of course, vary in each community.

The medical phases of the care of the patient also affect the character of the patient's quarters in important ways. Accustomed as we are to the specialists' standing guard over their sector of our anatomy, it is somewhat of a shock to remember that the "family doctor" is still practicing. He not only brings a boy into the world, but during the subsequent years cares for him in whooping cough, measles, pneumonia and scarlet fever, probably removes his adenoids and tonsils and, perhaps, his appendix. The small community hospital must provide for all of the specialties of a Bellevue or a Cook County, but the "family doctor" practices in all of them! The orthopedic ward of yesterday is the pediatric ward of today, and the obstetric ward of tomorrow. The ward remains the same but, like the chameleon, it changes its color to suit each occupant.

Theoretically at least, the small hospital need only recognize the division of sex. Under it only two wards would be necessary,—one for each sex, together with the necessary quiet rooms. The success of such an arrangement from the medical viewpoint would be entirely dependent on the quality of the nurses and their supervision, both of which are more likely to be uncertain in the small hospital than in the large. Another consideration, however, must be borne in mind—the lessened demand for obstetric and medical beds in a small community, often consisting of one-family houses. As a result, the hospital of under 25 beds is predominantly surgical.

The medical and economic factors point strongly to the single room for each patient. A few of these should be large enough for two beds and used as wards. It is doubtful whether anything larger than a four-bed ward should be considered. The size of the room and its equipment differ little from those of the larger hospital. One room with toilet adjacent should be arranged so that it may be entirely isolated, for even though no known contagious cases are admitted, they will develop in the community hospital and, unlike hospitals in larger places, there is usually no contagious hospital on which to unload the troublesome patient.

The grouping of the patients' rooms or wards should be determined largely by the size of the nursing unit. In a hospital conducting a training school the size is dependent on the capacity of a supervising (graduate) nurse to assist, instruct and supervise her pupils. With no more than 25 beds one nursing center is sufficient—and obviously all on one floor. The multi-storied buildings used for some of the smaller hospitals are much more difficult to "nurse" properly. Whether a hospital of 25 beds or under should attempt to maintain a training school has been the subject of considerable discussion. Where graduate nurses are used exclusively, many more patients may be properly supervised by one "head." In one such case the nursing of 70 patients is adequately supervised from one point. The accessories of the "nursing unit" do not differ markedly from those of the usual hospital unit,—toilets, bathrooms, utility rooms, linen room, nurses' station and serving pantry.

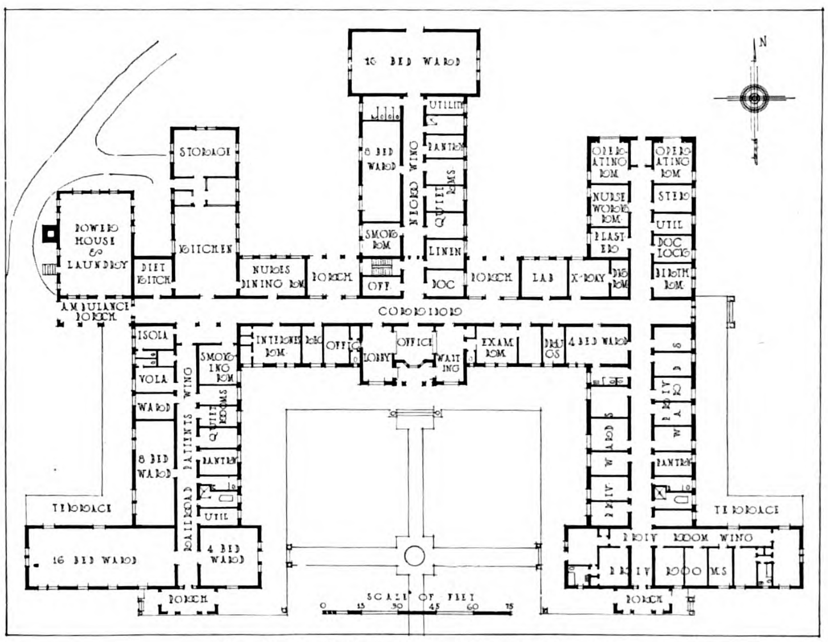
Like every department, the culinary must be reduced to its simplest elements. There are few hospitals with under 25 beds having a dietitian.

Trays will usually be set up in the kitchen and dispatched directly to the patients. Pupil nurses will be taught cooking either in the patients' pantry or in the kitchen itself Scientific dietetics, unfortunately, will be largely a matter of textbooks. The nurses' dining room will be served directly from the kitchen. The help will eat in the kitchen or, at best, in a small room immediately adjoining. The kitchen itself will be little more than a large domestic kitchen. There must, of course, be ample room for setting up trays, preparing salads, and for the tray dispatch by whatever means be adopted. There can be little excuse for rehandling; sending food in bulk to ward pantry and hot tables, and then redistributing it. The food problem, so difficult and distressing in large hospitals, is relatively simple here, and yet it must be remembered that it is of prime importance that hot, palatable food be served the patient. A central location for the kitchen is essential, but the architect must remember that a convenient and "rapid" kitchen is not a god-given heritage of the small hospital; only by the sweat of his brow will this be attained. And why should the kitchen be carefully tucked away among the pipes in the basement? It isn't economy in building, nor does it mean economy of operation. If this isn't desirable in the house, why in the hospital?

The laundry, even for 25 beds, is relatively simple. A washer, flat-work ironer, a few ironing boards, a three-part wash tub and a dry room are sufficient. If a linen chute is installed, the laundry should be at the base of the chute.

The boiler room and mechanical equipment present no problems. Low pressure or hot water heating is obviously desirable. There is no need for pressure cooking apparatus, and sterilizing as well as laundry should be by gas or electricity. The hot water heater might be of the garbage burner type. It would be better if this and the laundry were placed in a separate building near the hospital. The added expense of both installation and operation is an important element in a decision.

The large hospital has no monopoly on maintenance expense, and it is quite important to make all pipes accessible for inspection and repairs. This is especially true of soil and waste, hot water and steam return lines. The materials of any concealed pipes should be of the very best. The feature of the entire mechanical installation should be simplicity. Every item should be examined with regard to its probable necessity for repair and its ease of repair or replacement. A contrivance that cannot be repaired by the janitor should be given another inspection. If upon further inspection it is necessary to get an "expert" from the factory



Plan of a Single Story Hospital for a Southern City

Elevation of Single Story Hospital for a Southern City
Richard E. Schmidt, Garden & Martin, Architects

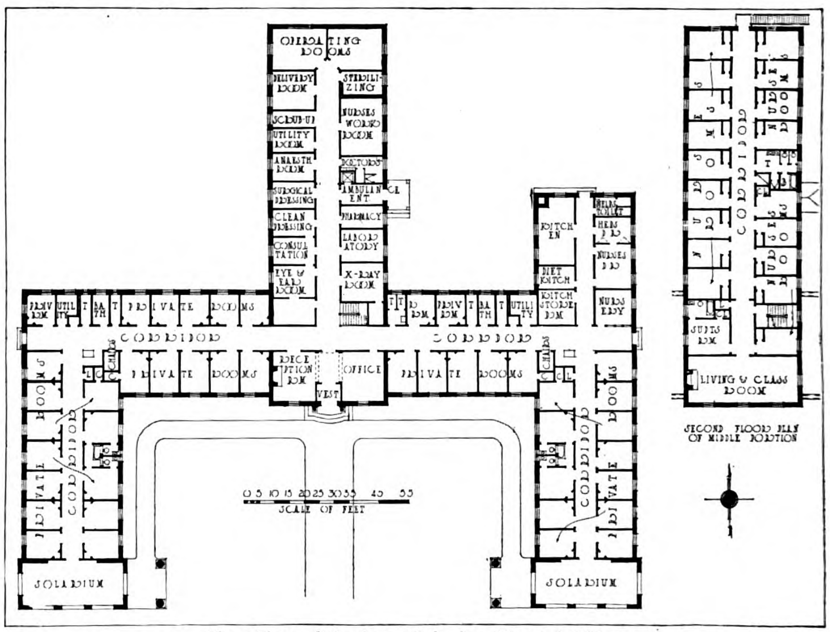
to do the tinkering, avoid it as one does the plague.

The administrative quarters are necessarily rigidly limited,—a general office for a clerk and a small switchboard, a superintendent's office and a record room. A place for the doctors to hang their coats and a small public lobby or reception room would complete this section. A hospital of 10 beds would have but one operating room with an adjacent supply room and doctors' locker room. This would act as an operating room for all of the 40 specialties for both "pus" and "clean" cases, as the birth room, and as a surgical dressing room. The hospital of 25 beds could use comfortably one additional operating-dressing room and larger workroom. The small hospital should be prepared to do all the scientific and diagnostic work of the large hospital. Actually, the limitations of purse and personnel result in the installation of an X-ray department and a pathological laboratory, for without these the hospital is a mere boarding house.

The laboratory and X-ray department had best be close to but not in the operating department, thereby grouping the technical departments. The character of the medical staff and the existing facilities of the community are important elements in determining the sizes of these departments. The community that does not need a hospital larger than 25 beds is usually lacking in properly equipped and staffed private X-ray departments and laboratories. These the hospital must provide. The minimum space requirements are about 200 square feet for each, with a dark room adjacent to the X-ray room.

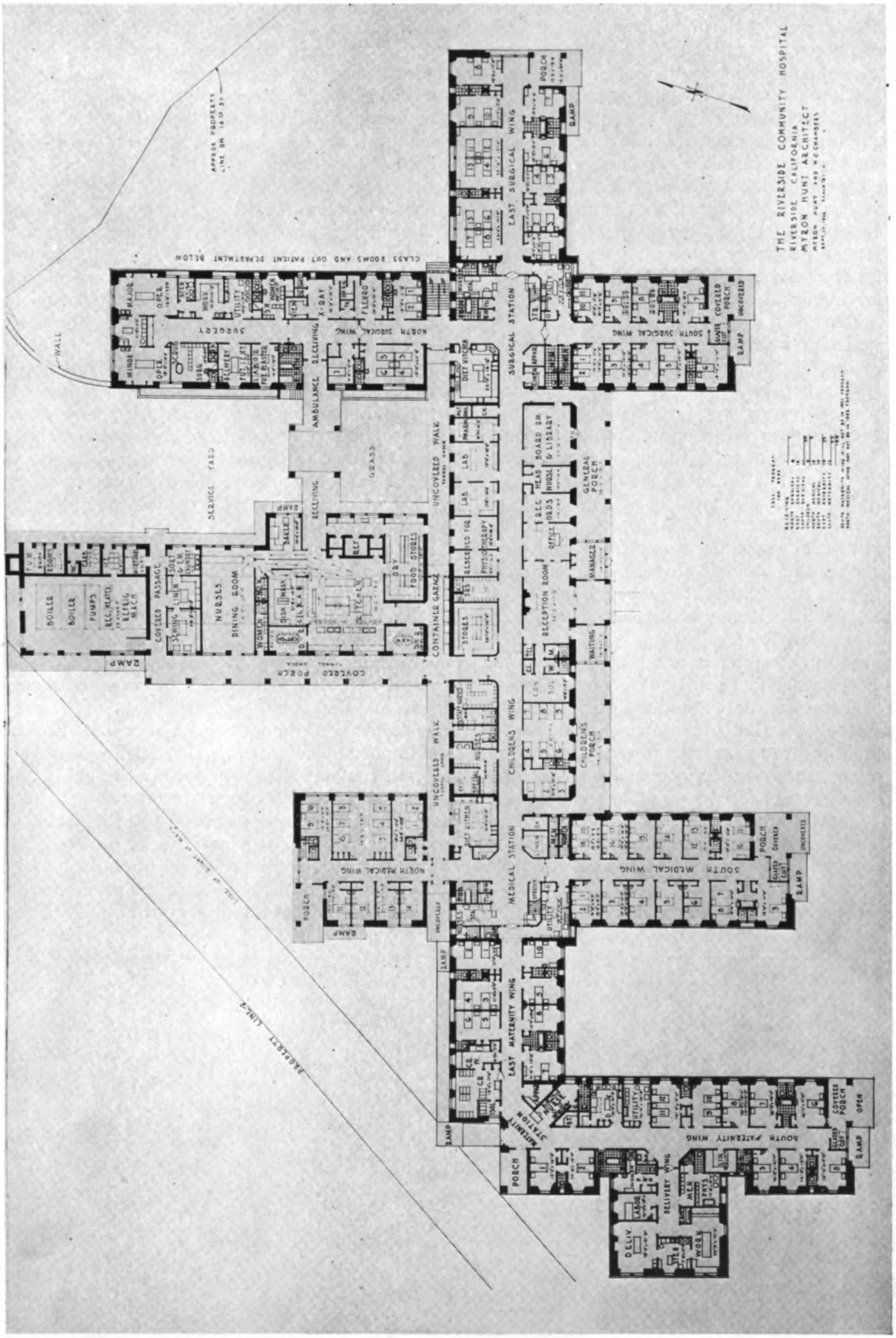
The pharmacy is a relatively unimportant part of the small hospitals. One of the graduate nurses may act as pharmacist, or a local druggist may come in every morning and put up the prescriptions, or else all compounding may be done at the local drug store. In the latter event a large closet only will be necessary. Much scientific apparatus (all of which takes space) will probably be omitted, because the apparatus is valueless unless there is a staff trained to operate it and to interpret the results.

An out-patient department would at most consist of one or two examination rooms. Their inclusion in the hospital is likely to raise a storm of protest by the doctors of the community, and should be suggested only after prayer and penance. If the physicians of the community can be induced to agree to the plan, it would be very desirable to provide offices for them in the hospital. They would, of course, be rented. Such an arrangement would affect the planning in many ways. X-ray room and laboratory should be accessible to the doctors' offices. Probably the size of the operating department should be increased to permit of more minor operations. Such an arrangement would undoubtedly redound to the advantage of the community, the



Floor Plans of Northwest Suburban Hospital, Chicago

Perspective of Northwest Suburban Hospital, Chicago
Richard E. Schmidt, Garden & Martin, Architects



THE RIVERSIDE COMMUNITY HOSPITAL, RIVERSIDE, CALIF.
MYRON HUNT AND H. C. CHAMBERS, ARCHITECTS

hospital and the doctors. To the community and the hospital because of the higher standards of work which would result, and to the doctors because more work would result from the better work done.

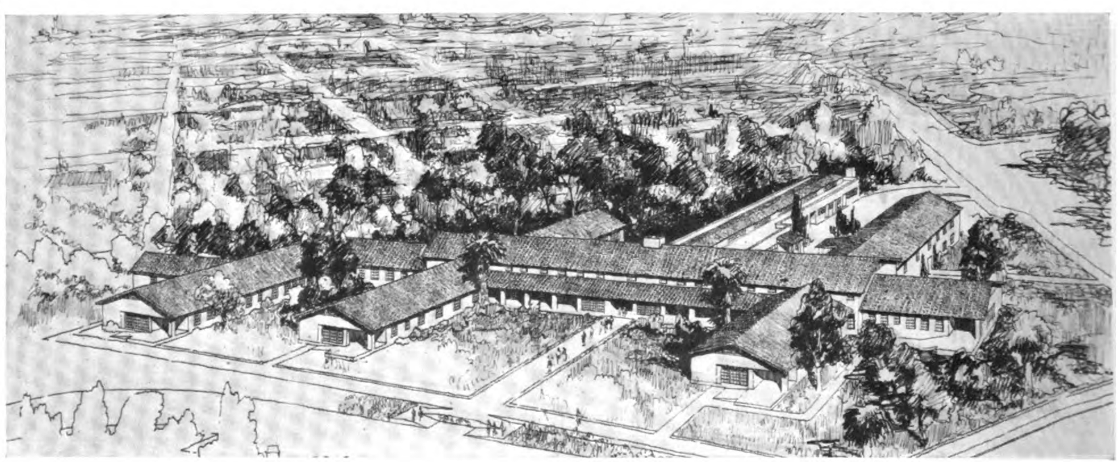
The ideal set by the hospital should include there being a resident physician or an interne. For the hospital of 25 beds or under this is more ideal than practical. Internes are not to be had, and a paid resident is almost as difficult to obtain. The duties ordinarily assigned to the internes will usually be done by the attending men assisted by nurses. It is necessary, however, that someone competent to make decisions and take action in an emergency live in the hospital. This is usually the superintendent.

It may be desirable to provide rooms for the janitor in the hospital, but it is doubtful practice to house any other employes in the hospital. Nurses and help should wherever possible be housed in buildings other than the hospital. While specially designed buildings are desirable, a commodious old house will often make an attractive nurses' home without much alteration. There must be some provision, either in the hospital or in the nurses' home, for graduate nurses on special duty with private patients. Some of these will come from distant points. In addition to the usual locker and toilet room facilities it may be necessary to provide some sleeping quarters.

The one-story hospital is undoubtedly the best for any hospital up to 25 beds. It is more efficient and cheaper in construction and maintenance. It is cheaper in construction because it eliminates elevators, stairs or ramps, eliminates duplication of service rooms, such as utility rooms, pantries, toilets and baths, etc.; it is cheaper in maintenance because of their elimination. Fewer nurses can properly care for 25 patients on one floor than would be required for 25 on two floors. It is more efficient (that is, producing better results for the patient) because it permits of better supervision of the nurses, insures speedier attention to the patients' wants, and more nearly adequate service facilities in the nurses' unit. Obviously a one-story building requires more ground than one of several stories, but ground values are usually low in the smaller communities. An important element is the ease with which patients may be brought into the open.

The 90-bed hospital for a Southern city illustrated here was developed rather carefully as a comparison with a two- and a three-story hospital. While other reasons dictated the construction of a multi-storied hospital, careful quantity surveys of both indicated that the one-story building was slightly the cheaper. The margin in favor of the one-story building increases very rapidly as the hospital grows smaller. Mr. Hunt's Riverside Hospital, and the Northwest Suburban Hospital by Schmidt, Garden & Martin indicate the perfect flexibility of the plan, and the ease with which a comprehensive program may be developed piecemeal. An element of constantly increasing importance is the appearance of our hospitals. Any architect will quickly grasp the wonderful possibilities of the one-story hospital.

Too much emphasis cannot be laid on the importance of careful planning, based on a thorough knowledge of the processes involved. The human and monetary waste in poorly arranged and improperly detailed hospitals is enormous, and when it is remembered that this waste goes on day after day and year after yeaı with little prospect of stopping it, and that it is a perpetual drain on the charitable funds of the community, it will be realized how important careful planning is. The benefit to the patients and the community through better and speedier service cannot be measured. Unfortunately, there can be no Moses to bring down the laws from the Mount. There can be no fixed rules as to how these hospitals should be built, for each has its special problem. Therein lies its fascination and danger for the architects who build them.



Bird's-eye Perspective, Riverside Community Hospital, Riverside, Calif.
Myron Hunt and H. C. Chambers, Architects

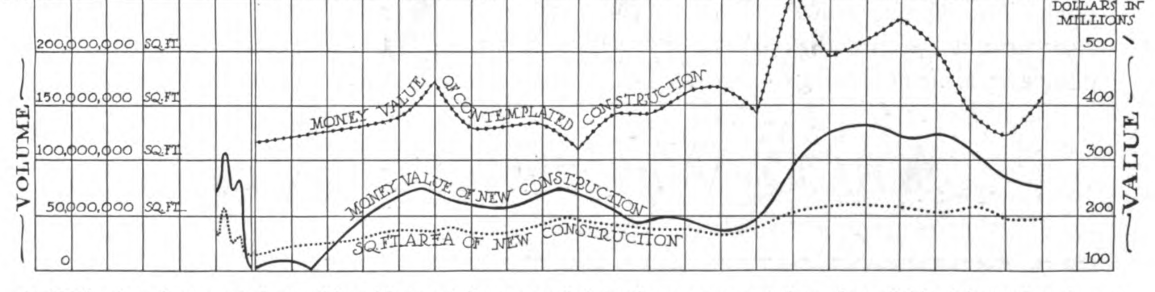
SERVICE SECTION
of THE ARCHITECTURAL FORUM

Information on economic aspects of construction and direct service for architects on subjects allied to building, through members of THE FORUM Consultation Committee

The Building Situation

As we reach the end of the year 1922 it is gratifying to realize that predictions made by THE ARCHITECTURAL FORUM during the past two or three years as to the excellent position which the architect would enjoy at this time have been more than fulfilled. 1922 has been one of the most satisfactory years which architects have known, because it has been the year of extensive building activity in which the growing recognition of architectural service on the part of the public has been demonstrated. It has been a year of satisfaction also because all evidence during the year indicates that a number of good years will follow.

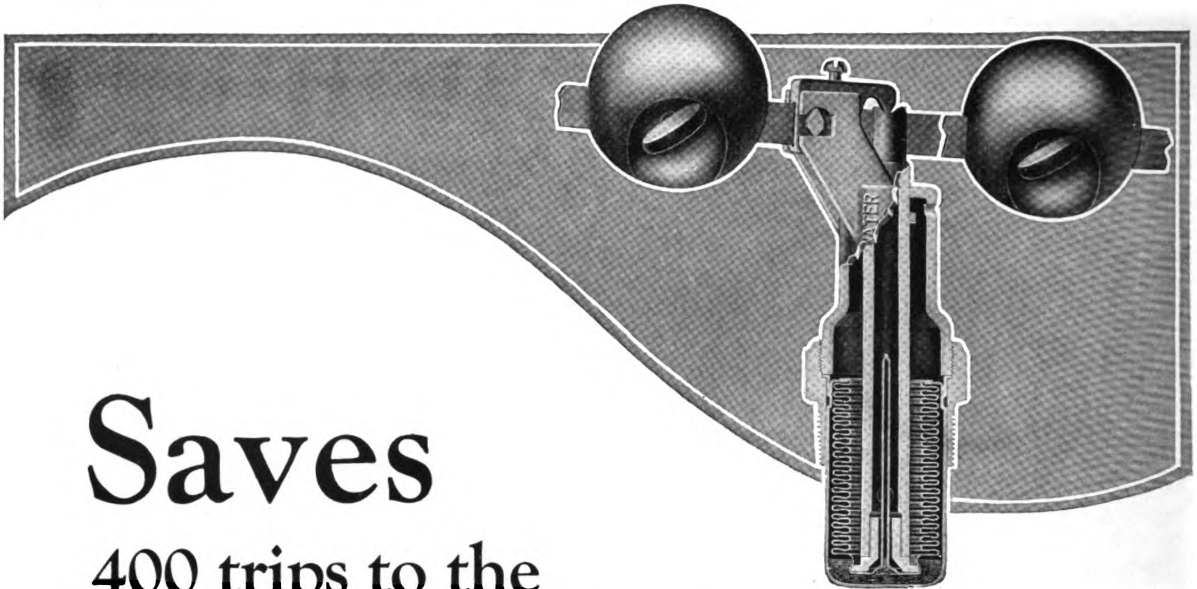
In the survey for 1922 made by THE FORUM in December, 1921, the prediction was made that 1922 would show an investment of over $4,000,000,000 in building construction. Building reports during this year have fully justified this prediction, giving added value to the forecast for 1923. As indicated in the chart below, building costs have recently passed out of the zone of stabilization, and the seasonal decline in contemplated construction and contracts let is augmented by this fact. The reasons for increased costs include not only depletion of building material supplies owing to the great demand for 1922, but include the after-effects of the rail and coal disturbances. We have every reason to believe that manufacturers are increasing production facilities and that, with conditions undisturbed, the supply of materials will be adequate to meet the demand next year, with a return in the cost index at least to the low level of the early summer of 1922. Manufacturers will probably decide with wisdom to take profits on volume, and the labor situation has at least one bright spot in the fact that the production per man in the building field has increased considerably. We therefore look forward to a sound and prosperous year for architects during 1923—a year in which hard work and merit will be surely recognized by an increasingly intelligent public.



THIS chart is presented monthly with trend lines extended to the most recent date of available information. Its purpose is to show actual changes in the cost of building construction and the effect upon new building volume and investment as the *index line of building cost* approaches or recedes from the "curve of stabilization."

The CURVE OF STABILIZATION represents the building cost line at which investors in this field may be expected to build without fear of too great shrinkage in the reproduction value or income value of new buildings. The index line representing actual cost of building entered the ZONE OF STABILIZATION in the fall of 1921. If this cost line passes *out* of the zone of stabilization, building volume will decrease materially.

The degree of the curve of stabilization is based on (a) an analysis of time involved in return to normal conditions after the civil war and that of 1812; (b) the effect of economic control exercised by the Federal Reserve Bank in accelerating this return after the recent war, and (c) an estimate of the probable normal increase in building cost.



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A few of the other hospitals using Truscon Products are:

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Murray Hospital, Butte, Mont.
Deaconess Hospital, Phoenix, Ariz.
Buffalo General Hospital, Buffalo, N. Y.
Lee Memorial, Johnstown, Pa.
Mattapan Hospital, Boston, Mass.
Emergency Hospital, Washington, D. C.
St. Elizabeth Hospital, Utica, N. Y.
Salem Hospital, Salem, Mass.
C. & O. Hospital, Richmond, Va.
Union Benevolent Assoc. Hospital, Grand Rapids, Mich.
City Hospital, Indianapolis, Ind.
Parkland Hospital, Dallas, Tex.
St. Joseph Sisters Hospital, Elmira, N. Y.
Hotel Dieu, New Orleans, La.
Levi Memorial Hospital, Hot Springs, Ark.
Tuberculosis Hospital, St. Paul, Minn.
Rockwell Field Hospital, San Diego, Calif.
Sara Leight Hospital, Norfolk, Va.
Good Samaritan Hospital, Lexington, Ky.
Non-Sectarian Infirmary, Mobile, Ala.
W. Penna. Hospital Assoc., Pittsburgh, Pa.
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BECAUSE hospitals must be *fire-proof*, Truscon Reinforcing Products have been used in innumerable buildings of this character. Because they must be *soundproof*, Truscon engineers have cooperated in securing the right construction for hospitals throughout this country and abroad. Because they must be *permanent*, Truscon Steel Quality Products have made them so.

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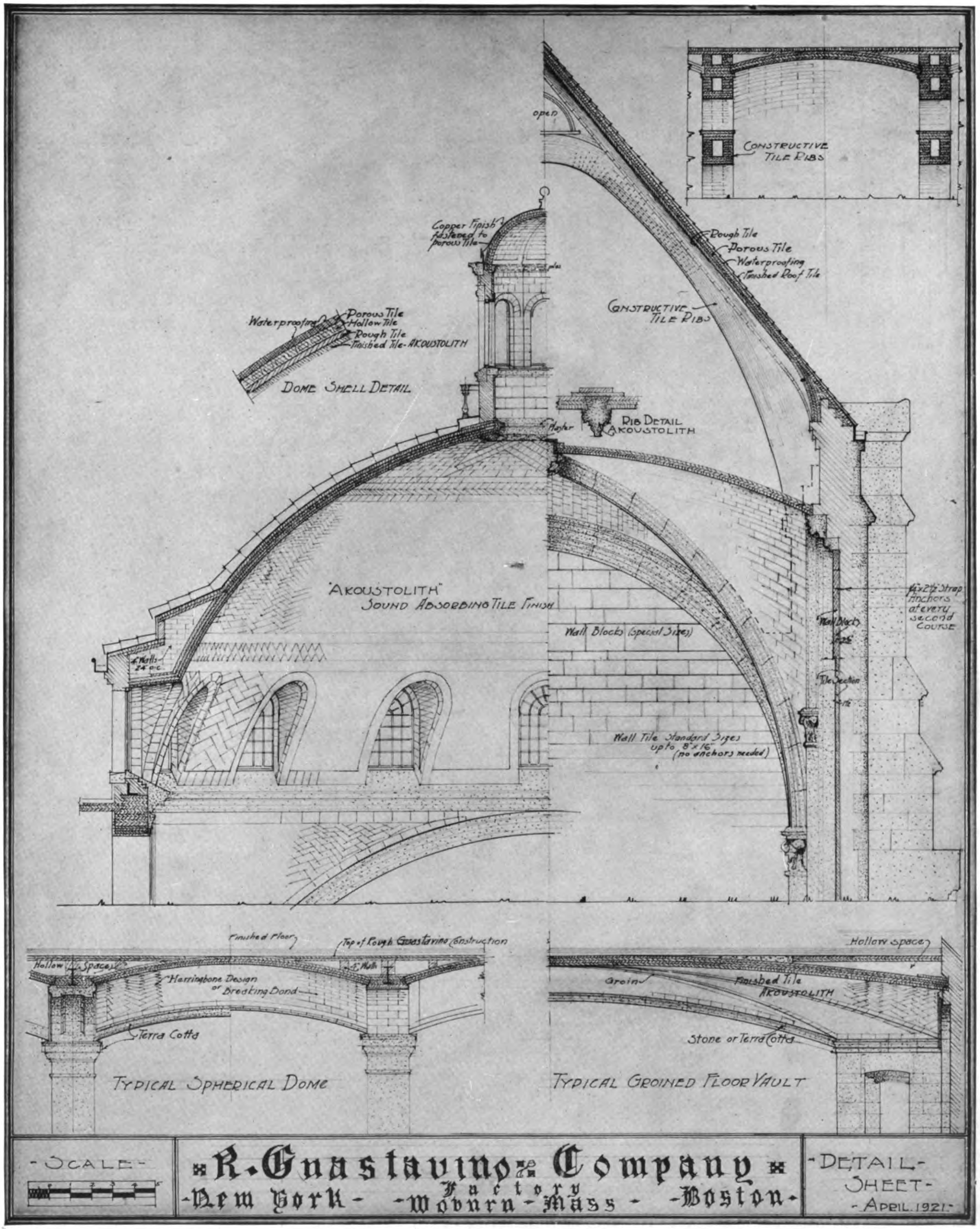
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open
Copper Finish fastened to Porous Tile
Rough Tile
Porous Tile
Waterproofing
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CONSTRUCTIVE TILE RIBS
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IN this hospital, where sanitation and cleanliness are elemental, the floors are Armstrong's Linoleum. Linoleum was used in halls, corridors and wards alike.

A property of linoleum that recommends it particularly for tuberculosis hospital use is its germicidal character, due to the oxidized linseed oil which forms one of its chief ingredients. Dr. Ludwig Bitter, a German bacteriologist, working in the Hygienic Institute in Kiel, on inlaid linoleum seven years old, found that " . . . virulent typhosus and streptococci or pus formers were killed in eight hours and that all impure micro-organisms brought in by dirty shoes were killed."

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A-14

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St. Joseph's Hospital
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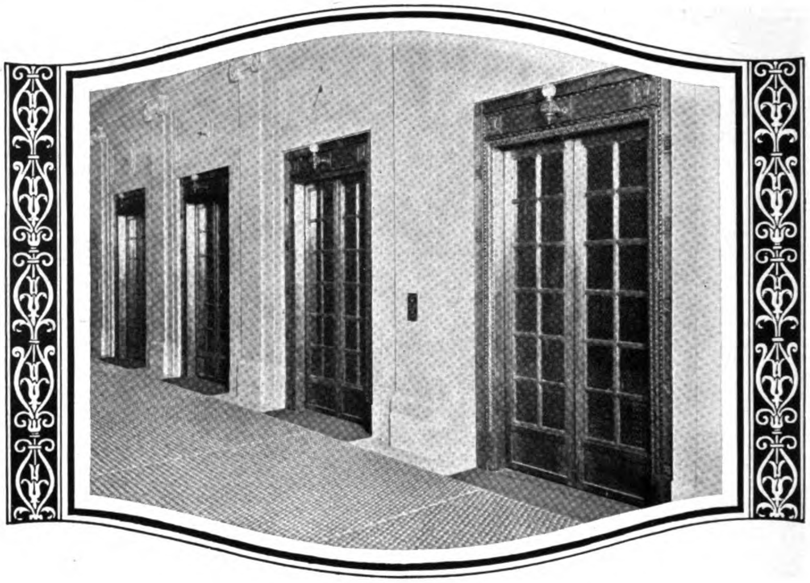
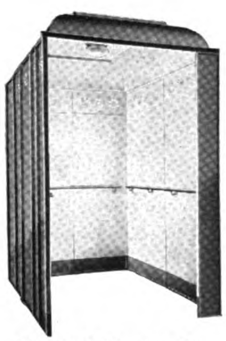
Henry Ford Hospital
Detroit, Mich.



ZONES OF QUIET



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IN the respectful quiet of a hospital, a clumsy, noisy elevator entrance is particularly conspicuous and annoying. The thoughtful restraint of physicians, nurses and visitors is all in vain if patients are disturbed by the rattling and banging of elevator doors.

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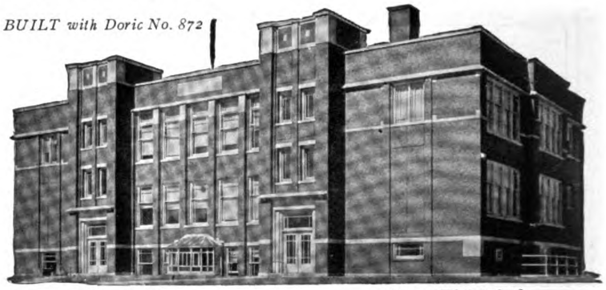

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Al. Pillsbury, Architect

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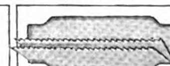

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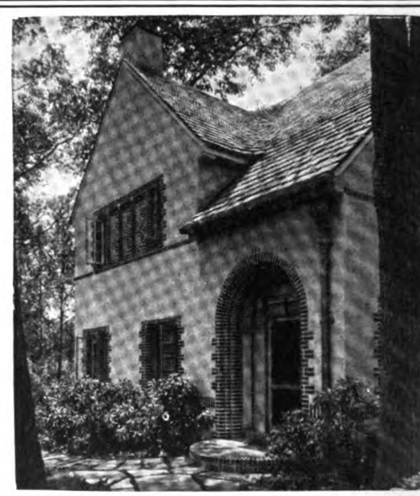

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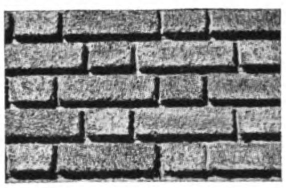

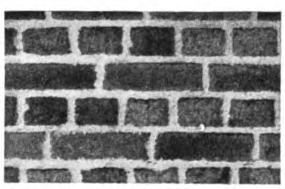

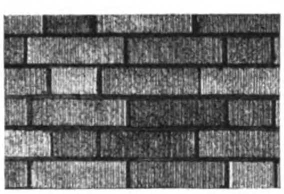

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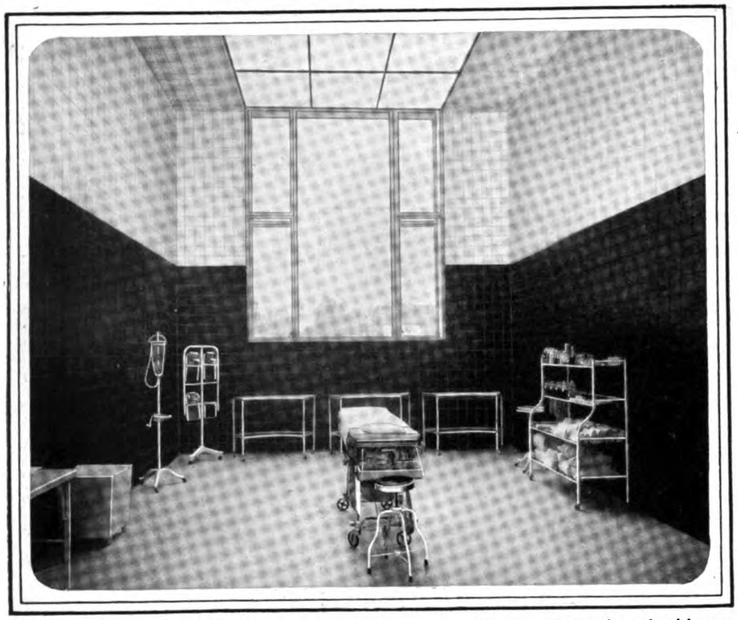

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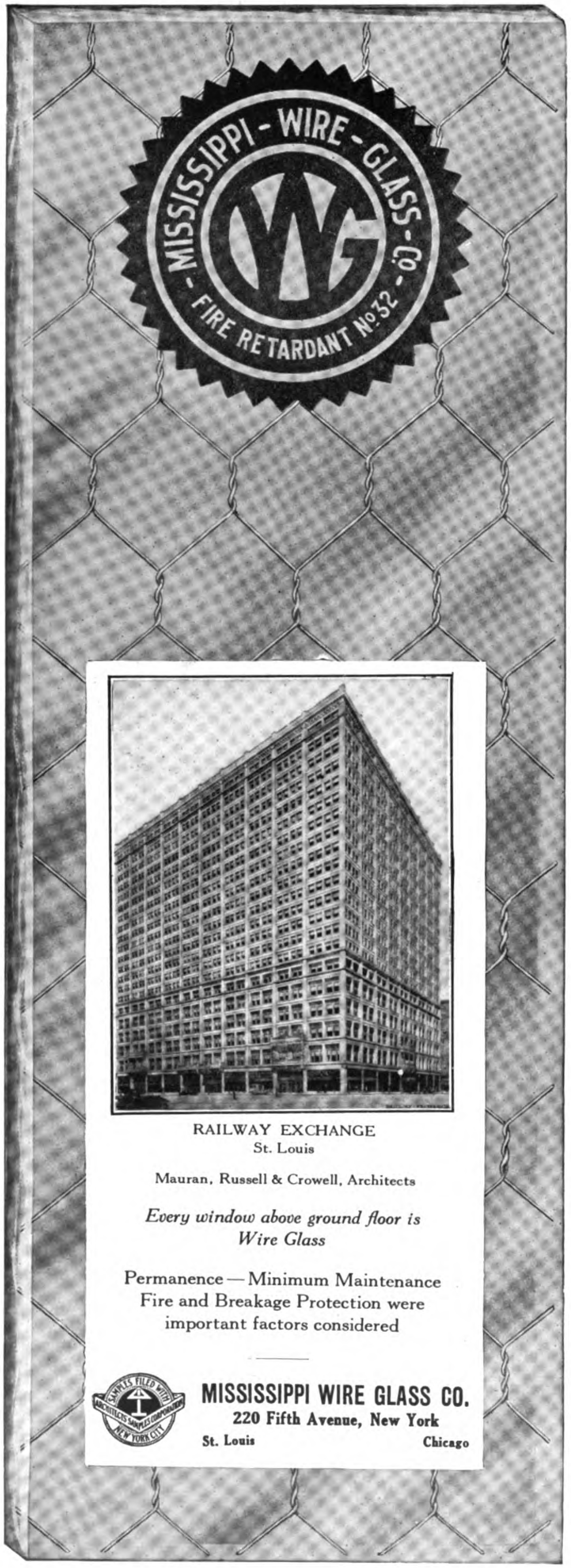

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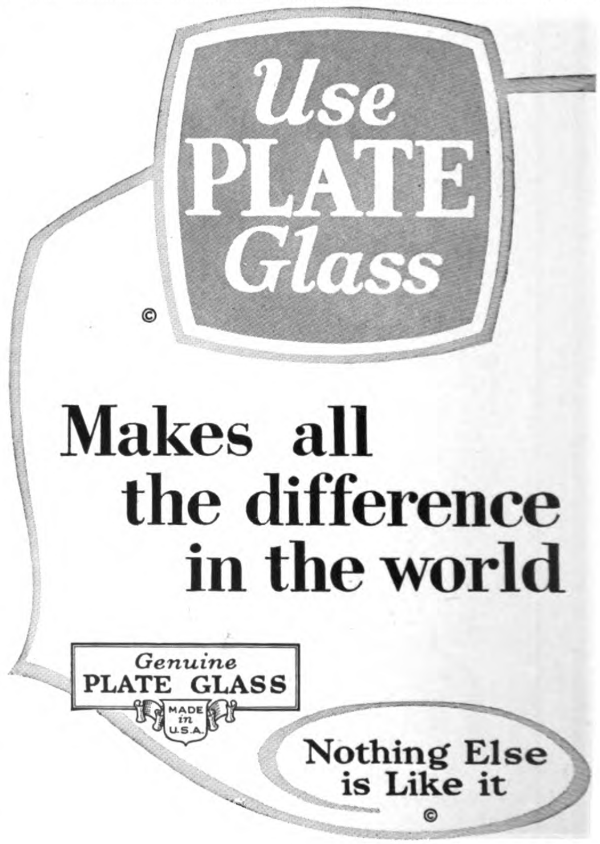

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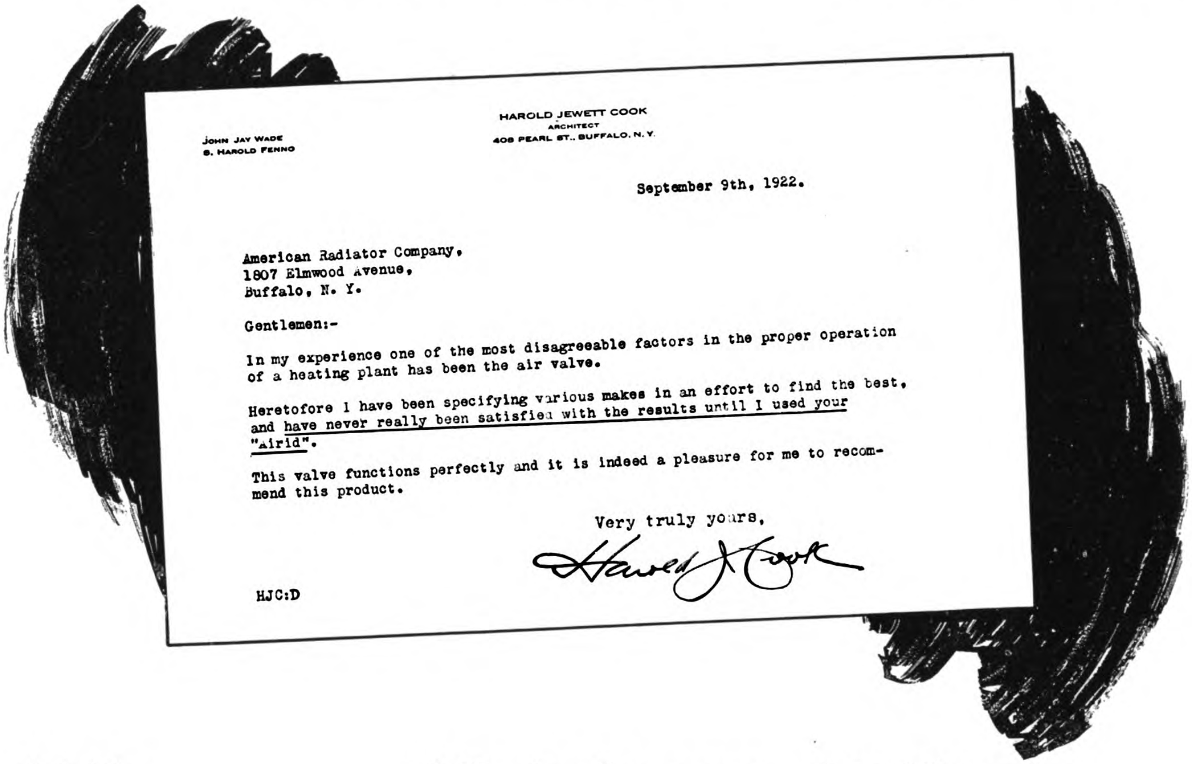
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HAROLD JEWETT COOK
ARCHITECT
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September 9th, 1922.

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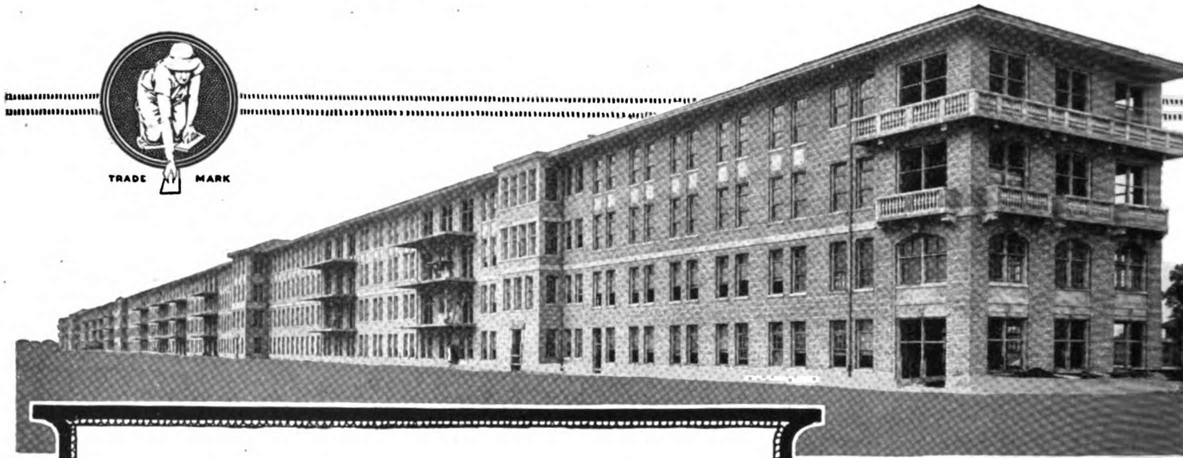


This large institution, the Edward Hines, Jr., Memorial Hospital at Maywood, Ill., has 600,000 square feet of Master Mix Floors. Contractor—Shank Company, Chicago. Acting Supervising Architect—James A. Wetmore

CONCRETE IS GIVEN HIGH RATING

Floor Committee of American Hospital Association recommends Concrete Floors (with Integral Hardner and Coloring) for practically every hospital service

CONCRETE Floors (with Integral Hardner and Coloring) were recommended as second choice by the Floor Committee of the American Hospital Association for the following hospital services at the Atlantic City Convention: Private Rooms, Wards, Service Rooms, Corridors, Service Corridors, Out-Patient-Treatment Rooms, Out-Patient Corridors, Offices. They were first choice for Laundries and Comparable Services.

The rating of 77 per cent for durability compared with the ratings of other types of flooring is, as the report shows, excellent. The rating for ease of maintenance is lower than we anticipated due to the comparative difficulty of repair. But the high ratings for durability and wearing quality answer every question on this point—they indicate positively that Masterbuilt Floors should not require repairs.

The length of life of a Masterbuilt Floor more than offsets any possible expense of maintenance

Ratings Given MASTERBUILT FLOORS

Sanitation—69 per cent

Non-Absorbency or resistance to moisture—up to 89 per cent

Abrasion or wearing quality—80 to 99 per cent

Durability—77 per cent

Ease of maintenance—69 per cent

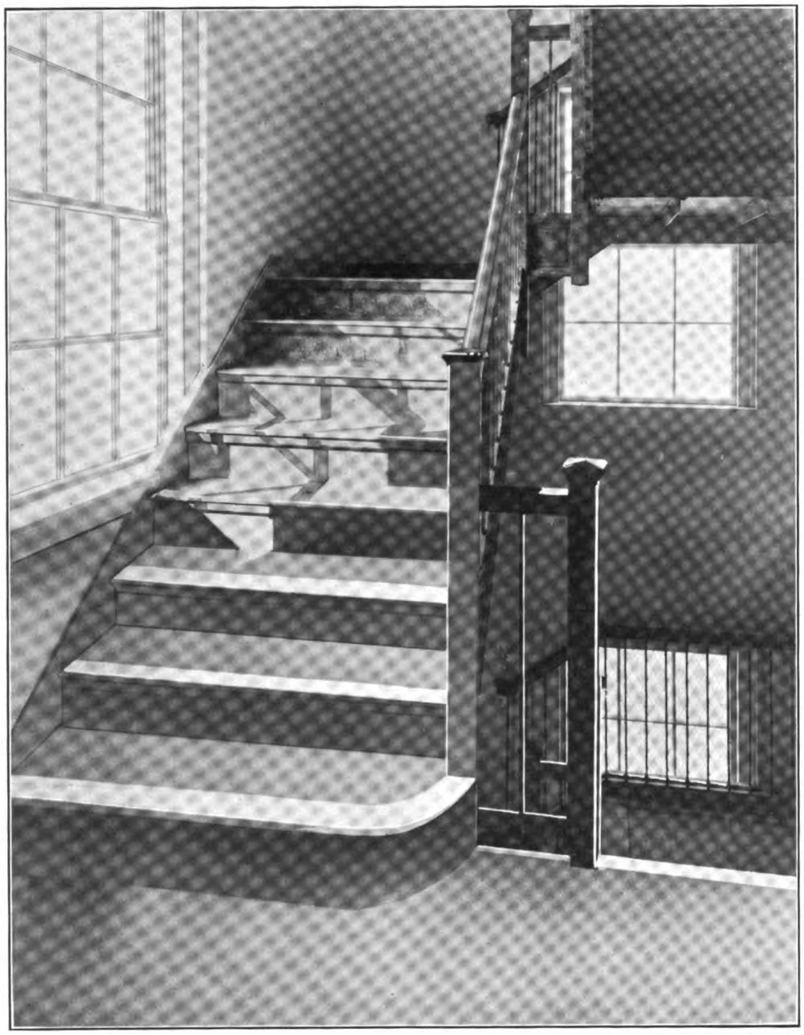
Acid and alkali resistance—85 per cent

Fire resistance—99 per cent

The Master Builders Co.
Cleveland, Ohio
Sales Offices and Stocks in 80 Cities

Masterbuilt Floors

UNIVERSAL SAFETY TREADS



Stairway, Boston Lying-In Hospital, Boston, Mass. Coolidge & Shattuck, *Architects*

FLAT TYPE WITH REINFORCED NOSING, USED IN THIS STAIRWAY

Sanitary • Non-Slip Rust-Proof • Durable

Sanitary

For hospitals and places where the utmost cleanliness must always be considered, we especially recommend our FLAT type, as no dirt can collect on it and it can be kept clean at all times.

Non-Slip

Alundum grains are the toughest mineral abrasive known, and the sharp edges present a non-slip surface which can never wear smooth, as no steel or other hard metal supports are exposed. The alundum is uniformly distributed throughout the depth of the lead, used as a binder, so that irrespective of the amount of wear a surface containing a large number of grains will always be uppermost. Hence perfect safety, combined with the greatest degree of permanence, is assured.

Rust-Proof

The non-slip alundum grains are held to the tinned steel base with a binder of lead which coats the tread on all surfaces and fills the voids between the grains. In this manner the iron base is doubly protected against rust, being fully covered by the tin and also the lead coating.

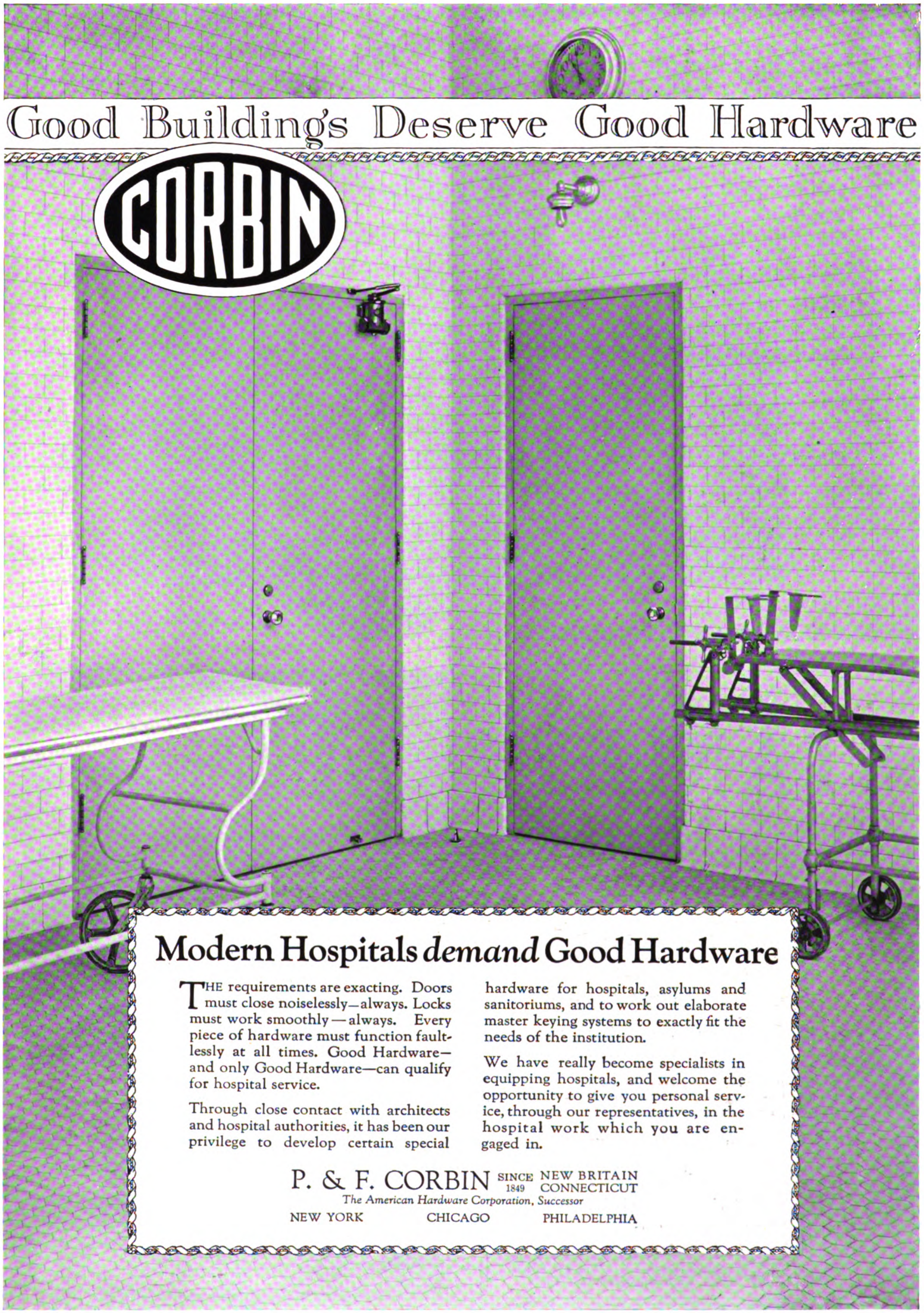
Durability

Alundum, being the hardest substance known, makes the best possible surface to prevent slipping and forms a lasting wearing tread which will endure for an indefinite time. The lead binder holds the grains in position, and being soft, it prevents them from being broken or disintegrated.

Universal Safety Treads have been installed on all stairs in the new Boston Lying-In Hospital and Nurses' Home (see plates 99 and 100 in this issue), as well as in several other hospitals by the same well-known architects, who thus show their confidence in our product.

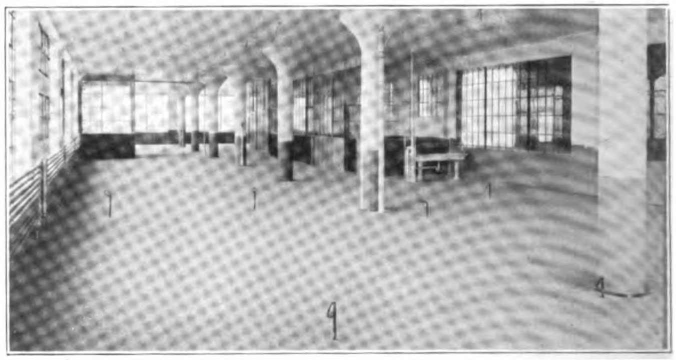
Other architects are welcome at all times to consult with us regarding the installation of safety treads, and we shall be pleased to forward our catalog and samples on request.

Universal Safety Tread Company - 40 Court St., Boston, Mass.

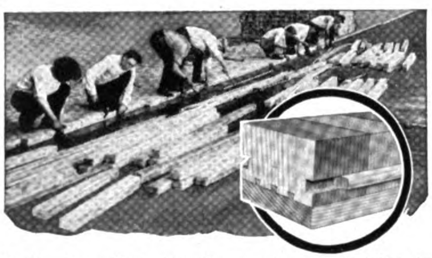

Good Buildings Deserve Good Hardware
CORBIN
Modern Hospitals *demand* Good Hardware
THE requirements are exacting. Doors must close noiselessly—always. Locks must work smoothly—always. Every piece of hardware must function faultlessly at all times. Good Hardware—and only Good Hardware—can qualify for hospital service.
Through close contact with architects and hospital authorities, it has been our privilege to develop certain special hardware for hospitals, asylums and sanitoriums, and to work out elaborate master keying systems to exactly fit the needs of the institution.
We have really become specialists in equipping hospitals, and welcome the opportunity to give you personal service, through our representatives, in the hospital work which you are engaged in.
P. & F. CORBIN SINCE 1849 NEW BRITAIN CONNECTICUT
The American Hardware Corporation, Successor
NEW YORK CHICAGO PHILADELPHIA

32,000 SQ. Ft.
BLOXONEND FLOORING
in the
Seymour Vocational School

A workroom in the Seymour Vocational School, Newark, N. J. Ely & Ely, Archts.



Bright
Clean
Durable



In the above illustration, Bloxonend is being laid directly on concrete slab by our lateral nailing method. This method eliminates embedded sleepers, nailing strips or wood subfloor.

THESE qualities combined with its lasting smoothness make BLOXONEND FLOORING particularly adaptable to vocational schools, manual training departments, school corridors and gymnasiums.

BLOXONEND — not loose blocks — is constructed of Southern pine. In the first stage of its manufacture the Southern pine blocks, with the end grain presented to wear, are dovetailed onto base boards approximating eight feet in length. This built-up strip is then accurately "milled" to exact size and grooved for splines. Because of its composite form, it lays like any good dressed and matched flooring, but with a smoother surface and one that remains smooth always.

Bloxonend is also paying for itself in hundreds of the leading industrial plants.

A few of the many architects who specify Bloxonend flooring for vocational departments:

Frank Irving Cooper	Boston, Mass.
C. B. J. Snyder	New York City
W. R. McCornack	Cleveland, Ohio
Guilbert & Betelle	Newark, N. J.
C. Godfrey Poggi	Elizabeth, N. J.
Chas. A. Smith	Kansas City, Mo.
Coffin & Coffin	New York City
Smith & May	Baltimore, Md.
J. Latenser & Sons	Omaha, Neb.

Write nearest office for Architectural specifications and a copy of "Booklet B"

Carter Bloxonend Flooring Company

R. A. Long Building, Kansas City, Mo.

Chicago: 332 South Michigan Ave.
Cleveland: 1900 Euclid Ave.

New York: 501 Fifth Ave.
Boston: 312 Broad Exchange

BLOXONEND
Lays Smooth — Stays Smooth

THE BRISTOL COMPANY

ANTIQUES · IMPORTS

Showroom:
154 East 55th Street

NEW YORK

Factory and Warehouse:
340-342 East 38th Street

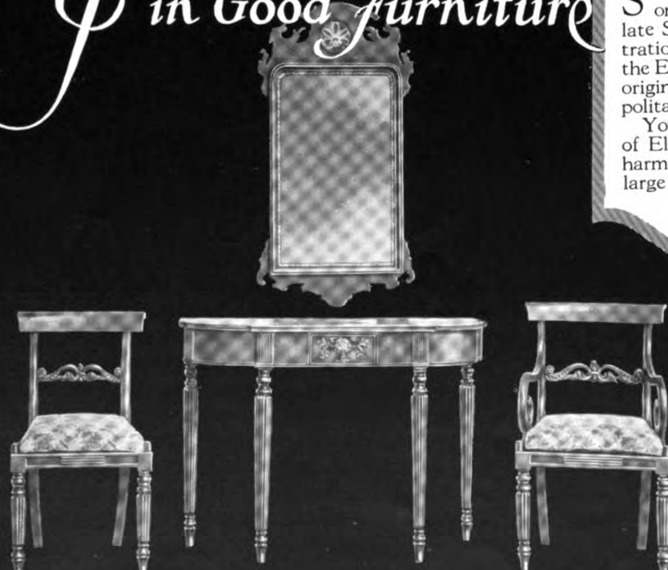
Announcing A New Importation

Of two unusual collections. One of French Needlework Chairs, the other includes Louis Quinze and Louis Seize occasional tables, with tops of marble and variegated veneer. Every piece is distinctly appropriate for holiday selling.

Illustration shows a new addition to the Bristol Reproductions. It is an authentic facsimile of a Queen Anne Burl Walnut Cabinet with shaped top, richly carved cabriole legs and hoof feet. The imported hardware is truly in keeping with the period design and the Bristol antique finish lends a mellow softness to the whole.

Manufacturers and Importers of Distinctive Furniture

Individualism ~ in Good Furniture



A Distinctive Set

SHAKESPEARE'S home at Stratford-on-Avon contained the original of this late Sheraton model side chair. The illustration shows a faithful reproduction by the Elgin A. Simonds Co. The old Colonial original of the mirror hangs in the Metropolitan Museum of Art.

You will always find distinctive models of Elgin A. Simonds Furniture that will harmonize. Special designs are made for large commissions.

Write for illustrated Booklet "M" on Home Furnishing

The Elgin A. Simonds Company Furniture Syracuse N.Y.

The Elgin A. Simonds Company
Manufacturers of Furniture
SYRACUSE, N.Y.
NEW YORK BOSTON CHICAGO

A floor of Armstrong's Cork Tile of attractive design in the main corridor of the Reid Memorial Hospital, Chicago, Illinois

A Floor That Needs No Covering

FLOOR *coverings* in hospital corridors and rooms need not concern you when the *floor* is Armstrong's Cork Tile; they are not needed. Comfort, safety and noiselessness underfoot are inherent in the resilient texture of the clean cork shavings of which Armstrong's Cork Tile is made. As for appearance, the distinctive mottled surface, the soft shades of brown and the attractive designs afford a most pleasing effect.

Sanitation and durability are also features that commend Armstrong's Cork Tile for hospital service. Practically nonabsorbent of water and most liquids, the floor is easily cleaned. It requires no polishing or varnishing. It does not "dust," crack or craze, and is so resistant to wear and abrasion that it will last for years with little expense for upkeep.

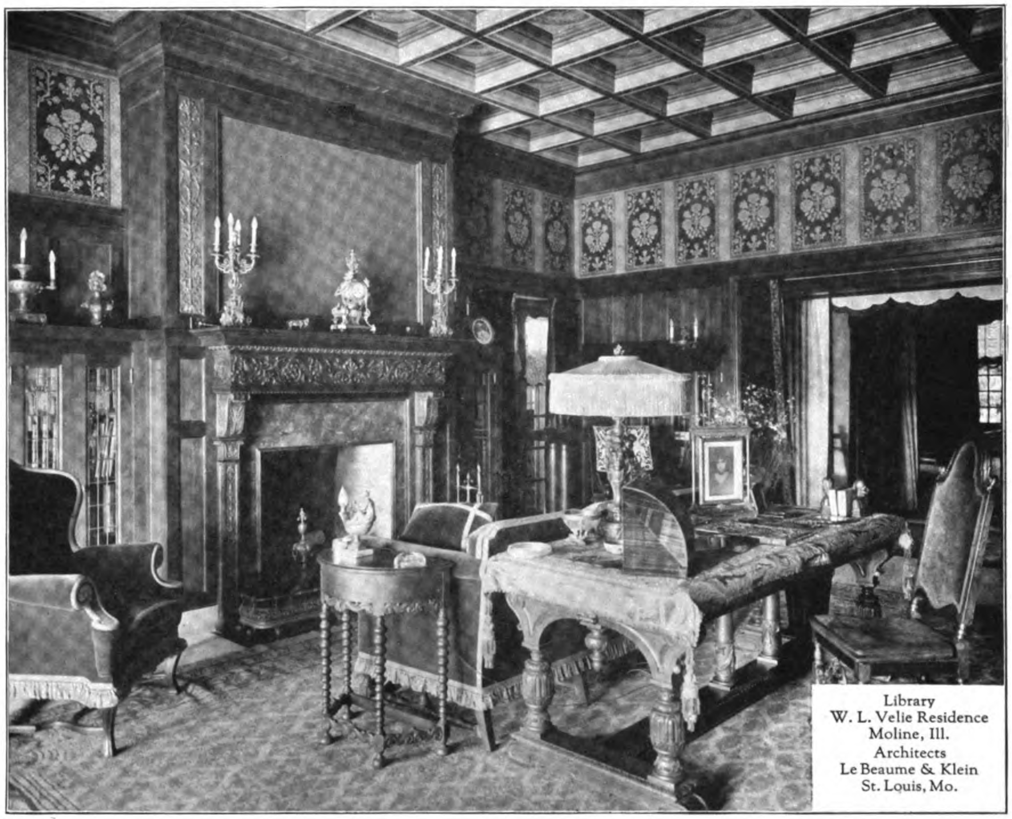
The 24-page book, "Armstrong's Cork Tile," is illustrated in color and contains a complete description and detailed specifications. A copy and sample tile will be forwarded you free of charge upon request.

Armstrong Cork & Insulation Co., 132 Twenty-fourth Street, Pittsburgh, Pa.

Also manufacturers of Linotile Floors

ARMSTRONG'S CORK TILE

REGISTERED U.S. PAT. OFF.



Library
W. L. Velie Residence
Moline, Ill.
Architects
Le Beaume & Klein
St. Louis, Mo.

N U M B E R S I X O F A S E R I E S

Putting Human Feeling Into Walls

American Walnut was chosen for this room, say the designing architects, "because of its richness of color and appropriateness in the general scheme of design."

The character of the house, a show place of the Middle West, is Italian Renaissance. The chief ornamentations in the library are the heavily coffered ceiling and the fireplace. The decorative frieze between cornice and wainscot consists of a repeated motif painted on canvas in dull gold and subdued reds and blues. The same colors are used, with different design, between the solid walnut beams in the ceiling, whose mouldings and soffits are also treated in these colors.

The mantel, of walnut, is exquisitely carved in the Renaissance manner, the fireplace being red Numidian marble. The walnut furniture is Italian Renaissance, although period is not closely observed. Hangings and upholstery are wine-colored, the carpet in the same tone, blending delightfully with the walnut wall panels.

The ensemble feeling of the room is warm and pleasant, with a rare touch of quiet and seclusion, soothing and refreshing by its sheer artistic merit.

Like their masters of old, leading architects today find in walnut the most satisfactory medium for furniture and interior finish, combining its fourfold virtues of being light, stable, durable and handsomely figured.

"The Walnut Book" and "Real Walnut Furniture"
Will Interest Every Architect

The first an accurate treatise on the development of walnut furniture and woodwork through the ages; the second an example of educational literature distributed to the public. Copies mailed free to architects, architectural firms, schools, societies or technical and professional libraries.

AMERICAN WALNUT MANUFACTURERS' ASSOCIATION
Room 1000, 616 South Michigan Boulevard, Chicago, Illinois

AMERICAN WALNUT

MAYO CLINIC BUILDING, ROCHESTER, MINN.
Grand Stairway, Walls, Fountains and Vases of Rookwood Faience
Made by The Rookwood Pottery Company, Cincinnati, U. S. A.

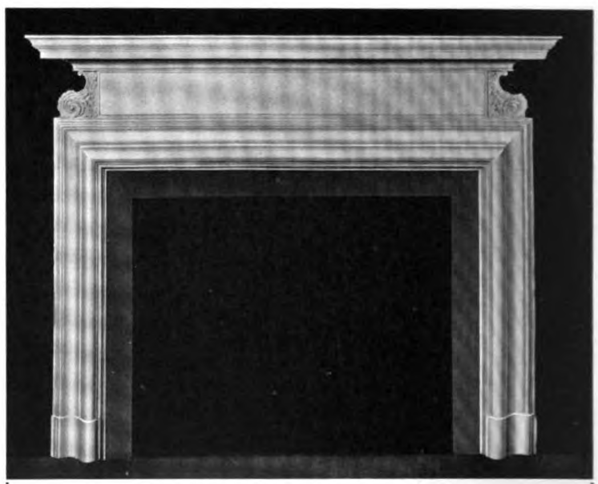
ELLERBY & ROUND, *Architects*

The Rotch Hospital, Boston, Mass.
Shepley, Rutan & Coolidge, Architects

MARBLE hospitals are both sanitary and permanent, combining rare beauty with practical worth. In this case the building material is Vermont Plateau Marble.

Branches in GOOD FOR ALL TIME VERMONT MARBLE *Large Cities*

VERMONT MARBLE CO PROCTOR VERMONT



ARNOLD & NORTH

Incorporated

124 East 41st Street New York

REPRODUCTIONS OF EARLY AMERICAN AND ENGLISH MANTELPIECES AND FIREPLACE ACCESSORIES

Booklets on Request

Mt. Sinai Hospital, Cleveland, Ohio. Architects: Geo. B. Post & Sons, New York City. Contractors: Reaugh Construction Co., Cleveland. Style of Architecture: English Renaissance of the Georgian Period. Ground floor treatment of Indiana Limestone. Brick walls trimmed with limestone on the first story and terra cotta above to match the limestone.

FACING a graceful curve of Liberty Row as it skirts the border of Cleveland's Wade Park, Mt. Sinai Hospital is not only the best located, but considered the best appointed hospital in that city.

The basement walls and floors are insured against the deteriorating effects resulting from penetration by moisture and dampness through the use of *Medusa Waterproofing.*

The application of *Medusa Waterproofing* is to form an integral part of the whole concrete mass, coating the tiny pores and voids with a water repellant lining that *keeps moisture out.*

Medusa Waterproofing is furnished separately in paste or powder form for mixing with any standard portland cement on the job, or already prepared in the form of *Medusa Waterproofed White and Gray Cements.* Booklets containing complete specifications for use, gladly forwarded at your request.

THE SANDUSKY CEMENT COMPANY
Department F **Cleveland, Ohio**

Manufacturers of Medusa Stainless White Cement (Plain and Waterproofed); Medusa Gray Cement (Plain and Waterproofed); Medusa Waterproofing (Powder or Paste); and Medusa Cement Paint.

MEDUSA
WATERPROOFING
for CONCRETE

Selected List of Manufacturers' Literature

FOR THE SERVICE OF ARCHITECTS, ENGINEERS, DECORATORS, AND CONTRACTORS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to *The Architectural Forum,* 142 Berkeley St., Boston, Mass., or the manufacturer direct, in which case kindly mention this publication.

Listings in this Department are available to any manufacturer at the rate of $5 per listing per month.

ASH HOISTS—ELECTRIC AND HAND POWER

Gillis & Geoghegan, 544 West Broadway, New York, N. Y.
General Catalog. 8½ x 11 in. 20 pp. Fully illustrated. Contains specifications in two forms (with manufacturer's name and without). Detail ¼" scale for each telescopic model and special material-handling section.
The Man-Saving Load Lifter. 5½ x 8½ in. 8 pp. Illustrated. Describes G&G Telescopic and Non-Telescopic Hoists for handling material in factories.

BOILERS—See Heating Equipment

BRICK

American Face Brick Association, 1751 Peoples Life Bldg., Chicago, Ill.
The Story of Brick. Booklet. 7 x 9¼ in. 55 pp. Illustrated. Presents the merits of face brick from structural and artistic standpoints. Tables of comparative costs.
The Home of Beauty. Booklet. 8 x 10 in. 72 pp. Color plates. Presents fifty designs for small face brick houses submitted in national competition by architects. Text by Aymar Embury II, Architect. Price 50c.
Bungalow and Small House Plans. Booklets. 8½ x 11 in. 50 pp. Illustrated. Four booklets, showing a variety of designs for small face-brick houses, covering 3, 4, 5, 6, 7 and 8 room houses. Price, 25c. each, $1 for the set.
A Manual of Face-Brick Construction. Booklet. 8½ x 11 in. Text-book on construction of the brick wall and various uses of face brick. 31 colored plates of brick houses with plans. Price, $1.00.
Architectural Details in Brickwork. Series 1, 2, 3. 8½ x 11 in. Very useful to the architect or draftsman. Sent free to architects applying on their office stationery. To others, $1.50.

BUILDING FINANCE

S. W. Straus & Co., 565 Fifth Ave., New York, N. Y.
The Straus Plan of Financing. Booklet. 8 x 6 in. 24 pp. Illustrated. Describes Straus system of co-operation with Architects, Builders, Engineers and Brokers in financing important building operations; also the making of construction loans on the larger and better properties in our large cities.
Forty Years Without Loss to Any Investor. Booklet. 8 x 5 in. 38 pp. Illustrated. A carefully prepared booklet for the thinking investor. Describes Straus bonds, the property upon which loans are made, and explains the Straus plan of safeguards which made possible the 40-year record.

BUILDING STONE—See Stone, Building

CEMENT

Atlas Portland Cement Company, 25 Broadway, New York, N. Y.
The Stucco House. Booklet. 8½ x 11 in. 96 pp. Illustrated. Contains valuable data on application of Portland Cement Stucco for those interested in building. Also photographic reproductions of beautiful and unusual stucco finishes, instructions and specifications.
Atlas Handbook on Concrete Construction. Book. 4¼ x 6½ in. 144 pp. Illustrated. Provides in convenient form practical information on concrete, plain and reinforced. Written from the practical rather than from the technical point of view. A valuable pocket text-book.

Carney's Cement Company, Mankato, Minn. Booklet. 8 x 10 in. 20 pp. Illustrated. Complete information on product, showing prominent buildings in which this cement has been used.

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
Brixment. Booklet. 7½ x 5 in. 16 pp. Illustrated. Brixment, what it is, what it does, how it does it and why.

Sandusky Cement Co., Dept. F, Cleveland, Ohio.
Medusa White Portland Cement, Stainless. Booklet. 8½ x 11 in. 48 pp. Illustrated.
Medusa Waterproof White Portland Cement. Booklet 6 x 9 in. 32 pp. Illustrated.
Medusa Review. 6 x 9 in. 18 pp. Illustrated. House organ issued bi-monthly.

CONDUIT

National Metal Molding Co., 1113 Fulton Building, Pittsburgh, Pa.
Bulletin of all National Metal Molding Products. In correspondence folder. 9½ x 11½ in.
Sherarduct. Circular. 5 x 8 in. Illustrated.
Flexsteel. Circular. 5 x 8 in. Illustrated.

CONSTRUCTION, FIREPROOF

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Fire Proofing Bulletin 171. 8½ x 11 in. 32 pp. Illustrated. A treatise on fire proof floor construction.

Northwestern Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Fireproof Construction. Catalog. 6 x 9 in. 72 pp. Illustrated. Handbook of practical suggestions for architects and contractors. Describing Nemco Expanded Metal Lath.
Fire-proof Construction. Handbook. 6 x 9 in. 72 pp. Illustrated. Describing Kno-Burn expanded metal lath.

United States Gypsum Company, 205 West Monroe St., Chicago, Ill.
Pyrobar Gypsum Tile. Booklet. 8½ x 11 in. 32 pp. Illustrated. Details and specifications for fireproof partitions.
Bulletins, 8½ x 11 in., containing details and specifications for Pyrobar voids for use with reinforced concrete joist floor construction; Pyrobar roof tile; and monolithic gypsum floors and roofs.

DAMPPROOFING

The Truscon Laboratories, Detroit, Mich.
Booklet. 5½ x 7¼ in. Illustrated. Contains descriptions and specifications of black dampproofing compounds for interior and exterior use.

DOORS, WINDOWS AND TRIM, METAL

Dahlstrom Metallic Door Company, 425 Buffalo Street, Jamestown, N. Y.
Architectural Catalog. 10 x 14 in. 46 pp. 11 sections. Illustrated. Catalog showing our regular styles and types of hollow metal doors and interior trim. Various types of frames and other architectural shapes also illustrated.
Architectural Portfolio. 14 x 18 in. 30 pp. Illustrated. Portfolio of various designs and types of Dahlstrom doors. Drawings and details of each style or type. This is only sent free to reliable architects.

The Compound & Pyrono Door Company, St. Joseph, Mich.
Pyrono Handbook for Architects and Contractors. 8½ x 11 in. 16 pp. Contains full information regarding Pyrono Fireproof Veneered Doors and Trim, with complete details and specifications.
Pyrono details in sheet form for tracing.

The G. Drouvé Company, Bridgeport, Conn.
Daylighting the Factory. Booklet. 8½ x 11 in. 26 pp. Illustrated. Describes and illustrates the "Anti-Pluvius" puttyless skylight construction. Also contains interesting information on how to judge a skylight and the advantages of skylighting industrial plants.

DUMBWAITERS

Kaestner & Hecht Co., Chicago, Ill.
Bulletin 520. Describes K. & H. Co. electric dumbwaiters. 8 pp.

Sedgwick Machine Works, 151 West 15th Street, New York.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ in. 60 pp. Illustrated.

ELECTRICAL EQUIPMENT

Frink, Inc., I. P., 24th Street and 10th Avenue, New York, N. Y.
Catalog 415. 8½ x 11 in. 46 pp. Photographs and scaled cross sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.

General Electric Company, Schenectady, N. Y.
Wires and Cables. Booklet. 8 x 10½ in. 85 pp. Illustrated. Four bulletins in a binder, describing wires and cables in general, conductors insulated with vulcanized rubber compound, varnished cambric and paper insulated cables, splicing materials and junction boxes for cable installations, armored cables.
Electric Fans. Folder. 6 pp. 3¼ x 6 in. Illustrated. Describes 1922 line of electric fans, giving catalog numbers, voltages and frequencies.
Reliable Wiring Devices. Catalog. 3 x 4½ in. 206 pp. Illustrated. Pocket catalog giving prices, schedule classifications and data for socket receptacles, switches, rosettes, cutouts and fuses for miscellaneous devices.
Lighting of Public Buildings. Bulletin. 6 x 9 in. 25 pp. Illustrated. Describes lighting of galleries, banks, museums, libraries, municipal, county and state buildings.

Hart & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn.
A new H & H Switch. Leaflet. 3½ x 6 in. 4 pp. Illustrated. Illustrates a new H & H composition base push switch of DeLuxe quality.
Tumbler Switches. Booklet. 3½ x 6 in. 6 pp. Illustrated. Shows complete line of H & H Tumbler Switches.
H & H Elexits. Booklet. 8 x 10¼ in. Illustrated. Shows new complete line of Elexits—places for lights. May be used for Wall Receptacles or Electric Fixtures.
H & H Radio Button Push Switches. Booklet. 3½ x 6 in. Illustrated. Radio Luminous Buttons applied to Push Switches and Sockets.

Kohler Co., Kohler, Wis.
Kohler Automatic Power and Light 110 Volt D. C. Booklet. 5 x 7 in. 32 pp. Illustrated. Describes a standard voltage automatic, electric power and light plant for isolated homes.

Simplex Wire & Cable Co., 201 Devonshire Street, Boston, Mass.
Simplex Manual Catalog and reference book. 6¾ x 4¼ in. 92 pp. Contains in addition to information regarding Simplex products, tables and data for the ready reference of architects, electrical engineers and contractors.

Sprague Electric Works of the General Electric Company, 527 West 34th St., New York, N. Y.
Panel Boards and Cabinets. Catalog No. 47901. 8 x 10½ in. 70 pp. Illustrated. Panel Boards and Cabinets shown in this catalog have been selected after careful study of the general requirements. All appliances listed herein meet with the requirements of the National Board of Fire Underwriters.
Panel Circuits. Bulletin No. 47941. 8 x 10½ in. 8 pp. Illustrated. In addition to circuits for panel boards illustrated, a full line of circuits for panel boards having fuses inside branch circuit switches is also listed.
Panel Boards and Cabinets. Bulletin No. 47942. 8 x 10½ in. 16 pp. Illustrated. This bulletin covers the ever increasing demand for devices that provide maximum safety to the operator.
Dead Front Panels. Pamphlet No. 727. 5¼ x 7¼ in. 8 pp. Illustrated. A "Safety First" pamphlet covering Safety Panels and Dead Front Switchboards, for use in office buildings, factories, theaters, department stores, public buildings and in all places where the switches may be operated by persons ignorant of the changes of contact with current-carrying parts.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 61*

ELECTRICAL EQUIPMENT—Continued

Varnum Door Engine Company, 949 West 16th St., Los Angeles, Calif.
Varnum Electric Door Engines. Booklet. 5 x 7¾ in. 16 pp. Illustrated. Descriptive booklet containing illustrations and list of representative institutions now using Varnum Door Engines.

ELEVATORS

Kaestner & Hecht Co., Chicago, Ill.
Bulletin 500. Contains 32 pp. Giving general information on passenger elevators for high buildings.

Otis Elevator Company, 11th Ave. & 26th Street, New York, N. Y.
Otis Push Button Controlled Elevators. Booklet. 6 x 9 in. 56 pp. Illustrated. Detailed description of Otis Push Button Elevators. Their uses in residences, stores, institutions, apartment houses, business offices and banks, etc.
Otis Gravity Spiral Conveyors. Booklet. 6 x 9 in. 56 pp. Illustrated. Gravity spiral conveyors for lowering packaged merchandise, boxed, caged and bundled goods in factories, warehouses, terminal buildings, etc.
Otis Electric Traction Elevators. Booklet. 9 x 12 in. 28 pp. Illustrated. Full details and illustrations of Otis geared and gearless traction elevators for all types of buildings.
Otis Escalators. Booklet. 6 x 9 in. 36 pp. Illustrated. Description of step and cleat type single and double file escalators (moving stairways).

Sedgwick Machine Works, 151 West 15th Street, New York.
Catalog and descriptive pamphlets. 4½ x 8½ in. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.

FENCES

American Fence Construction Co., 130 West 34th St., New York.
Afco Factory Fences. Booklet. 9 x 12 in. 32 pp. Illustrated.
Residential Fences. Booklets. 7 x 2½ in. Illustrated. A series of booklets on residential fences consisting of photographs and brief descriptions.

Page Steel and Wire Company, Bridgeport, Conn.
Page American Ingot Iron Fence. Booklet. 4 x 6¾ in. 76 pp. Illustrated. Complete information, with diagrams, sizes, etc., for those interested in rust-resisting iron fence made of ARMCO iron.
Page Ornamental Fence for Lawn and Garden. Booklet. 6 x 9 in. 12 pp. Illustrated. Description, with photographs and diagrams of lawn fence and gates. Complete instructions for ordering fence.

The Stewart Iron Works Company, Cincinnati, Ohio.
Book of Designs "B." 9 x 12 in. 80 pp. Illustrated. Book of designs illustrated from photographs of ornamental iron fence and entrance gates erected by us. Valuable to architects.

FIRE DOORS—See Doors, Windows and Trim, Metal

FIREPLACE EQUIPMENT

Covert Co., H. W., 137 E. 46th Street, New York, N. Y.
Hints on Fireplace Construction. Catalog. 5¾ x 8½ in. 11 pp. Illustrated. Diagrams of construction and installation of Covert "Improved" and "Old Style" Dampers and Smoke Chambers. Also illustrations of Covert brass and wrought iron Fireplace Fittings.

FLOORING

Armstrong Cork & Insulation Co., 132 24th Street, Pittsburgh, Pa.
Linotile Floors. Catalog. 6 x 9 in. 40 pp. Color plates. Describes Linotile, a composition of ground cork, wood flour, linseed oil and various gums and pigments in tile form.
Armstrong's Cork Tile. Revised Edition. Booklet. 24 pp. 5 x 7 in. Illustrated in color. Contains complete specifications.

Armstrong Cork Co. (Linoleum Dept.), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 in. 54 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.
Decorative Floors. Booklet. 11¼ x 15 in. 16 pp. Color plates.
Armstrong's Linoleum Pattern Book, 1922. Catalog. 3½ x 6 in. 168 pp. Color plates. Reproductions in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. Three books. 3½ x 5¾ in. Showing all gauges and thicknesses in the Armstrong line of linoleum and cork carpets.
Detailed Directions for Laying and Caring for Linoleum. Handbook. 5 x 7 in. 48 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Business Floors. Booklet. 6 x 9 in. 48 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

Congoleum Company, Inc. (Linoleum Dept.), Philadelphia, Pa.
"Specifications for Laying Linoleum and Cork Carpet, according to the Congoleum Company's new method compiled after years of careful research."
Linoleum Service Sheet. Gives complete printed specifications as well as detail drawings showing application in specific cases such as thresholds, staircases, under radiators, etc.
Installation and Care of Battleship Linoleum. Booklet. 6 x 9 in. 24 pp. Illustrated. Instructions as to the uses of Battleship Linoleum, its laying and care.
Pocket Pattern Book. Descriptive Booklet. 3½ x 8½ in. 64 pp. Illustrated. Shows color reproductions of every grade and color of Gold Seal Battleship Linoleum, Inlaid Linoleum, Cork Carpet and also all patterns of the Gold-Seal Line.

Maple Flooring Manufacturers Assn., Stock Exchange Bldg., Chicago, Ill.
Flooring of Maple, Beech and Birch. Booklet. 9½ x 7 in. 46 pp. Illustrated. A complete manuscript on Maple, Beech and Birch Flooring, written by Forest Crissey.

FLOORING—Continued

Maple Flooring Manufacturers Assn.—Continued
Color Harmony in Floors. Booklet. 24 pp. 6¾ x 4½ in. Illustrated. Reproductions in six colors of 12 styles of maple, beech and birch floors, with a short message on the subject.
How to Lay and Finish Maple, Beech and Birch Floors. Booklet. 6¼ x 3⅜ in. 16 pp. Illustrated. A handbook on laying maple, beech and birch floors and on keeping them in good condition.
Grading Rules for Maple, Beech and Birch Flooring. Leaflet. 6¼ x 3½ in. 8 pp. Illustrated. Contains information on grades, standard measurement, custom governing re-inspection, etc.

The Marbleloid Co., 461 Eighth Ave., New York, N. Y.
The Universal Flooring for Modern Buildings. Booklet. 6¾ x 9¾ in. 32 pp. Illustrated. Describes uses and contains specifications for Marbleloid flooring, base, wainscoting, etc.
Marbleloid Flooring for Hospitals. Bulletin. 8½ x 11 in. 4 pp. Illustrated. Describes the especial features of this composition floor for hospital buildings.
Marbleloid Specifications. Booklet. 8½ x 11 in. 4 pp. Illustrated.
Marbleloid Flooring for Schools. Bulletin. 8½ x 11 in. 4 pp. Illustrated. Describes special features of this composition floor for school buildings.

Thos. Moulding Brick Company, 133 West Washington St., Chicago, Ill.
T-M-B Mastic Flooring. Catalog. 6 x 9¼ in. 16 pp. Illustrated. Includes specifications also.

Muller Co., Franklyn R., Waukegan, Ill.
Asbestone Composition Flooring. Circulars. 8½ x 11 in. Description and Specifications.

The Nairn Linoleum Company, 179 Belgrove Drive, Kearny, N. J.
Linoleum. Booklet. 5½ x 8½ in. 68 pp. Illustrated in color. Reproductions in color of Inlaid, Printed, Plain and Battleship Linoleum; also Cork Carpets and Felt Base Floor Coverings.

Oak Flooring Advertising Bureau, 1057 Ashland Block, Chicago, Ill.
Modern Oak Floors. Booklet. 6¼ x 9¼ in. 24 pp. Illustrated. A general book that tells the complete story on Oak Flooring.
Oak Flooring, How and Where to Use it. Booklet. 3½ x 6¼ in. 16 pp. Illustrated. A small, technical book showing the general rules, standard thickness and widths, how to lay, finish and care for oak floors.

FLOOR HARDENERS

General Chemical Company, The, 25 Broad Street, New York, N. Y.
Making Concrete Wear Like Iron. Booklet. 4 pp. 8½ x 11 in. Illustrated. Describes Hard-n-tyte and its application to concrete floors.
Casehardening Concrete. Folder. 3¾ x 8½ in. 6 pp. Illustrated. Describes treatment of concrete surfaces with Hard-n-tyte so that they become literally "casehardened."
The Hard-n-tyte Specification. Booklet. 8½ x 11 in. 4 pp. Gives exact specifications for concrete floor finish.

Sonneborn Sons, Inc., L., 116 Fifth Avenue, New York.
Concrete and Lapidolith. Booklet. 5¾ x 8½ in. 24 pp. Illustrated. Describing relation of Lapidolith chemical floor hardener to concrete construction.
Why Lapidolise? Booklet. 8½ x 11 in. 11 pp. Illustrated. Reasons why Lapidolith should be specified.
Lapidolith Specifications. Circular. 8½ x 10¾ in. 2 pp.

FLOOR HARDENERS (CHEMICAL)

The Truscon Laboratories, Detroit, Mich.
Agatex and Its Performances. Booklet. 8½ x 11 in. 16 pp. Describes use of Agatex Liquid Chemical for hardening cement floors.

FLOOR HARDENERS (METALLIC)

The Truscon Laboratories, Detroit, Mich.
Truscon Floor Hardener. Pamphlet. 7¾ x 5¼ in. 18 pp.

FURNACES—See Heating Equipment

FURNITURE

Estey Organ Company, Brattleboro, Vt.
Pipe Organs. Complete specifications and full information furnished to the architect for pipe organ to be installed in any given residence, upon receipt of plans and other particulars.

Hampton Shops, 18 East 50th St., New York, N. Y.
Glimpses from Hampton Exhibits. Brochure. 16 pp. 5 x 7¼ in. Illustrated. Shows examples of Hampton work and gives one an idea of their resources. Of interest to the client as well as to the architect.

Kensington Mfg. Company, 14 East 32nd St., New York, N. Y.
Photographs and full description of hand-made furniture in all the period styles furnished promptly in response to a specific inquiry.
Illustrated booklet indicative of the scope, character and decorative quality of Kensington furniture mailed on request.

Kewaunee Mfg. Company, Kewaunee, Wis.
Book No. 13. 6 x 9 in. 194 pp. Illustrated. Full description of Kewaunee Vocational Equipment for domestic science, demonstration dining rooms, fitting rooms, drafting rooms, manual training and shop-equipment, kindergarten and hospital equipment and dietetic tables.
Book No. 14. 6 x 9 in. 226 pp. Illustrated. Shows Laboratory furniture for chemistry, physics, biology, zoology, electrical and physiography laboratories, medical college, hospital laboratory equipment, industrial and commercial laboratory equipment. Engineering service gratis.

One reason why Mt. Sinai is a model Hospital

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Anaconda Brass Pipe resists corrosion and water drawn from it is always as clear and pure as its source. Benedict Nickel is white clear through and never needs replating.

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AMERICAN BRASS COMPANY

General Offices: WATERBURY, CONN.

In Canada: ANACONDA AMERICAN BRASS LIMITED: New Toronto, Ontario

ANACONDA
BRASS PIPE

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 62*

FURNITURE — Continued

Charles P. Rogers & Co., Inc., 14-16 East 33rd St., New York, N. Y.
A Guide to Buying Quality Furniture, Beds and Bedding. Booklet. 4 x 6 in. Illustrated. Describes the manufacture of good furniture as compared with the ordinary kind.

Elgin A. Simonds Company, Syracuse, N. Y.
Furnishing the Home. 24 pp. 6 x 9 in. Illustrated. A treatise on modern interior decoration.

GLASS CONSTRUCTION

Mississippi Wire Glass, 220 Fifth Avenue, New York.
Mississippi Wire Glass. Catalog. 3½ x 8½ in. 32 pp. Illustrated. Covers the complete line.

GRANITE—See Stone, Building

HARDWARE

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

McKinney Mfg. Co., Pittsburgh, Pa.
McKinney Cabinet Hardware. Catalog. 6 x 9 in. 32 pp. Illustrated. Describes complete line of hardware for cabinet and furniture work.
McKinney Hardware for Sliding Doors. Booklet. 6 x 9 in. 18 pp. Illustrated. Describes different types of sliding door hardware.

Stanley Works, The, New Britain, Conn.
Wrought Hardware. Catalog. BJ10. 6¾ x 10 in. Color plates. Shows all of the Stanley Works products made of steel from their own mills.

Vonnegut Hardware Co., Indianapolis, Ind.
Von Duprin Self-Releasing Fire Exit Devices. Catalog. 12F 8 x 11 in. 41 pp. Illustrated.
"Saving Lives." Booklet. 3½ x 6 in. 16 pp. Illustrated. A brief outline why Self-Releasing Fire Exit Devices should be used.

HEATING EQUIPMENT

American District Steam Company, North Tonawanda, N. Y.
Bulletin No. 150-AF. 6 x 9 in. 32 pp. Illustrated. Describes the Adsco System of Atmospheric Steam Heating and explains how it saves 20 to 30% of fuel cost. Tells how to figure radiation.
Catalog No. 21-AF. 6 x 9 in. 200 pp. Illustrated. Lists and describes the full line of equipment and devices manufactured for use on underground and interior steam mains, expansion joints, steam meters, condensation meters, traps, flange fittings, angle fittings, manhole curbs, alignment guides, etc.

Clarage Fan Company, Kalamazoo, Mich.
Catalog No. 52. 8½ x 11 in. 84 pp. Illustrated. Describes Clarage Kalamazoo Multiblade Fans and Heaters for use in schools, churches, hospitals and industrial plants. Engineering data, capacity tables and dimensions included.

James B. Clow & Sons, 534 S. Franklin Street, Chicago, Ill.
Gasteam. Catalog. 6 x 9 in. 16 pp. Illustrated. New radiator using gas for fuel.

Excelso Specialty Works, 119 Clinton St., Buffalo, N. Y.
Excelso Water Heater. Booklet. 12 pp. 3 x 6 in. Illustrated. Describing the new Excelso method of generating domestic hot water in connection with heating boilers. (Firepot Coil eliminated.)

Gorton & Lidgerwood Co., 96 Liberty Street, New York, N. Y.
Gorton Self-Feeding Boilers. Booklet. 4¼ x 7¼ in. 32 pp. Illustrated. Descriptions, specifications and prices.

Johnson Service Company, 149 Michigan St., Milwaukee, Wis.
Regulation of Temperature and Humidity. Booklet. 11¼ x 8½ in. 64 pp. Illustrated. Describes Johnson system of pneumatic, automatic regulation of temperature and humidity, and illustrates thermostats, valves, air compressors, dampers and other parts.
Johnson Electric Thermostats, Valves and Controllers. Booklet. 6½ x 3½ in. 24 pp. Illustrated. Excellent plates showing electric thermostats and controllers.

Kelsey Heating Company, James St., Syracuse, N. Y.
Booklet No. 5. 4 x 9 in. 32 pp. Illustrated. A dealers' booklet showing the Kelsey Warm Air Generator Method of warming and distributing air. Gives dimensions, heating capacities, weights, kind of coal recommended, and shows the mechanical and gravity system of heating homes, churches and schools.
Monroe Pipeless Booklet. 4½ x 8 in. 20 pp. Illustrated.
Monroe Tubular Heater. Booklet. 4½ x 8 in. 20 pp. Illustrated. General Booklet giving capacities, dimensions, weights, etc.
Syracuse Pipeless Booklet. 4½ x 8 in. 12 pp. Illustrated. General Booklet, giving sizes and capacities.

Kewanee Boiler Co., Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 in. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 73. 6 x 9 in. 35 pp. Illustrated. Describes Kewanee steel power boilers with complete specifications.

Minneapolis Heat Regulator Company, Minneapolis, Minn.
The Heart of the Heating Plant. Catalog. 6 x 9 in. 20 pp. Illustrated. Describing the Minneapolis Heat Regulator, its construction, application and operation for the automatic control of temperature where coal, gas, fuel oil or street steam is used.

Page Boiler Company, The Wm. H., 141 West 36th Street, New York, N. Y.
Page Boilers. Catalog. 4½ x 8 in. 84 pp. Illustrated. Descriptions with specifications of the Volunteer Round and Monarch Square Sectional Boilers; also the Monarch Up-Draft and Down-Draft Smokeless Boiler; with method for apportioning size of boiler and radiation, and other heating data.

HEATING EQUIPMENT— Continued

United States Radiator Corporation, Detroit, Mich.
The Complete Line. Catalog. 3¾ x 6½ in. 269 pp. Illustrated. New edition, intended as a handy reference book for those who design or install heating and ventilating systems.
Capitol Smokeless Type Boilers. Booklet. 8½ x 11 in. 12 pp. Illustrated. Describing a new type of low-pressure heating boiler which burns soft coal without smoke.

HEAT REGULATORS—See Heating Equipment

HOISTS

Gillis & Geoghegan, 544 West Broadway, New York.
Hoists for Industrial Plants. Booklet. 6 x 8¾ in. 8 pp. Illustrated. Labor saving service in the lifting or lowering of lighter loads, through the use of G & G Telescopic and Non-telescopic Hoists.
Removing Ashes. Booklet. 6 x 8¾ in. 6 pp. Illustrated. Removing ashes from boiler room directly to wagon by electrically operated Telescopic Hoists.

HOLLOW TILE—See Tile, Hollow

INSULATION

Bishopric Manufacturing Co., 103 Este Ave., Cincinnati, Ohio.
For All Time and Clime. Booklet. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric stucco base and Bishopric plaster base.

Philip Carey Co., The, Cincinnati, Ohio.
Carey Asbestos and Magnesia Products. Catalog. 6 x 9 in. 72 pp. Illustrated.

United States Gypsum Company, 205 West Monroe St., Chicago, Ill.
Bulletin. 8½ x 11 in. Details and specifications for insulating roofs to prevent condensation.

United States Mineral Wool Co., 280 Madison Ave., New York, N. Y
The Uses of Mineral Wool in Architecture. Booklet. 5¼ x 6½ in. 24 pp. Illustrated. Describes properties of mineral wool as insulation against heat, frost, sound. Specifications and section drawings for use as a fireproofing. Rule for estimate and cost.

KITCHEN EQUIPMENT

Wm. M. Crane Company, 16–20 West 32nd St., New York, N. Y.
VULCAN Gas Ranges and Appliances. Booklet. 5 x 8 in. 50 pp. Illustrated. Describes complete line, including VULCAN SMOOTH-TOP Compact Cabinet Gas Ranges for kitchens in the home.
VULCAN Gas Equipment for Hotels, Hospitals, Restaurants, etc. Booklet. 5 x 8 in. 45 pp. Illustrated. Equipment for heavy-duty cooking requirements, with information of value to architects in planning kitchens.

LATH, METAL AND REINFORCING

North Western Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Designing Data. Catalog. 6 x 9 in. 94 pp. Illustrated. Describes most efficient use of Econo Expanded Metal Reinforcing.
Formless Concrete Construction. Catalog. 6 x 9 in. 80 pp. Illustrated. Describes use of T-Rib Chanelath, a form and reinforcing for concrete.

LEADERS AND GUTTERS

Copper & Brass Research Assn., 25 Broadway, New York, N. Y.
Copper Roofing. Booklet. 8½ x 11 in. 32 pp. Illustrated. Gives information regarding weights of various roofing materials. Describes up-to-date practice and methods of laying copper roofs; decorative effects and how to obtain them. Gives specifications and details. Flashings, reglets, gutters and leaders, cornices and copper-covered walls.

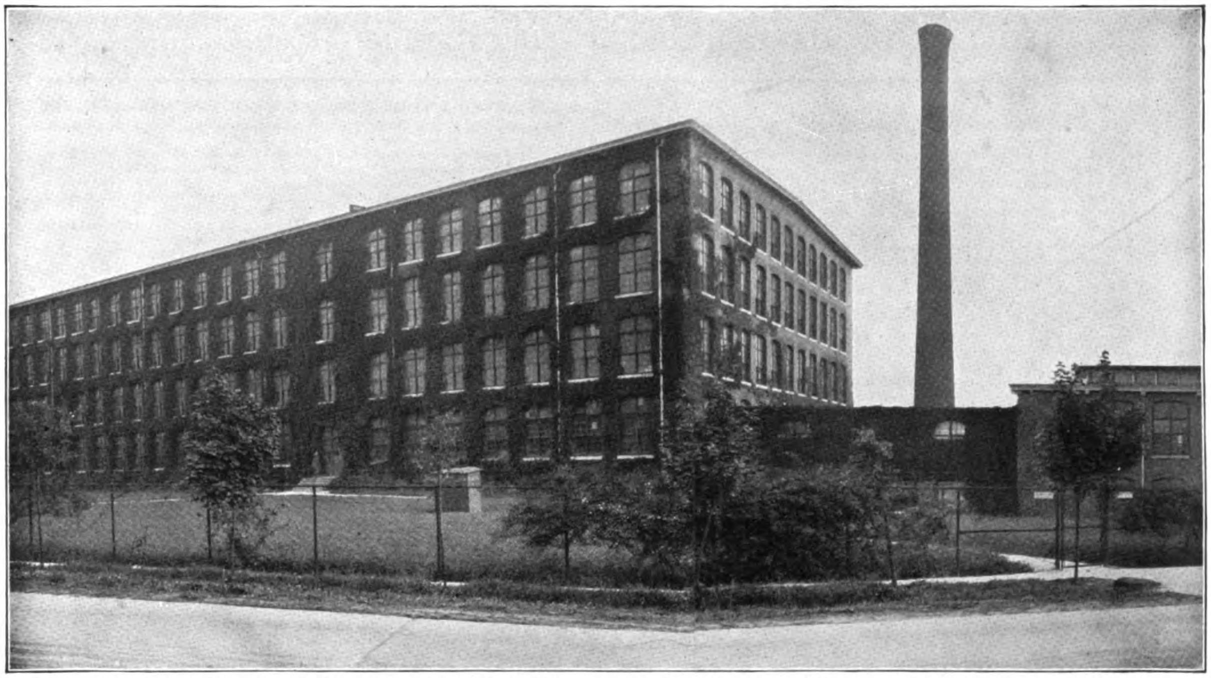
MAIL CHUTES

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

MANTELS

Arnold & North, Inc., 124 East 41st St., New York, N. Y.
Booklet. 5 x 6 in. Contains photographic reproductions of a variety of old English and Colonial mantelpieces with complete information as to sizes and prices.

Arthur Todhunter, 414 Madison Ave., New York, N. Y.
Mantels and Fireplace Equipment. Booklet. 8½ x 11 in. Illustrated. Separate sheet plates showing mantels installed and furnished, also andirons and grates grouped with suitable pieces, also lanterns, weather-vanes and hand-wrought hardware. All sizes and descriptions given on each plate.



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The fence illustrated above was installed by General Equipment Co., of Charlotte, N. C.

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ARMCO Ingot Iron

The only wire fence made of Armco Ingot Iron

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 64*

MARBLE

The Georgia Marble Company, Tate, Ga. New York office, 1328 Broadway.
Why Georgia Marble is Better. Booklet. 3¾ x 6 in. Gives analysis, physical qualities, comparison of absorption with granites, opinions of authorities, etc.
Convincing Proof. Booklet. 3¾ x 6 in. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

Tompkins-Kiel Marble Company, 505 Fifth Ave., New York, N. Y.
Reproductions in natural colors of imported and domestic marbles and stone for interior and exterior uses.
Bulletins, 9¾ x 12¾ in., illustrating buildings of various types in which Tompkins-Kiel Marble Company's imported and domestic marbles and stone have been used.

Vermont Marble Company, Adv. Dept., Proctor, Vt.
The Book of Vermont Marble. Booklet. 8½ x 11 in. 68 pp. Illustrated. A reference book for architects, describing various kinds of Vermont Marble, with illustrations and details.
Marble Banks and Modern Business. Booklet. 7¾ x 10½ in. 48 pp. Illustrated. Contains many pictures of important Vermont Marble bank work, with certain tests and analyses relating to the product.

METAL LATH—See Lath, Metal and Reinforcing

METALS

American Brass Company, Waterbury, Conn.
Illustrated pamphlet describes the use and adaptability of extruded architectural shapes to meet the architect's design.

American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
Reference Book. Pocket Ed. 2½ x 4½ in. 168 pp. Illustrated. Covers the complete line of Sheet and Tin Mill Products.
Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8½ x 11 in. 20 pp. Illustrated.
Research on the Corrosion Resistance of Copper Steel. Booklet. 8½ x 11 in. 24 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under actual weather conditions.
Facts Simply and Briefly Told. Booklet. 8½ x 11 in. 16 pp. Illustrated. Non-technical statements relating to Keystone Copper Steel.
Black Sheets and Special Sheets. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes standard grades of Black and Uncoated Sheets, together with weights, bundling tables, etc.
Bright Tin Plates. Catalog. 8½ x 11 in. 16 pp.

Bridgeport Brass Company, Bridgeport, Conn.
Seven Centuries of Brass Making. Booklet. 10½ x 8 in. 78 pp. Illustrated in color. A brief history of the ancient art of Brass Making and its early (and even recent) method of production—contrasted with that of the Electric Furnace Process—a twentieth century achievement of the Bridgeport Brass Company.
Tested High-Speed Brass Rod. Booklet. 10½ x 8 in. 16 pp. Illustrated. Short treatise on the manufacture of Brass Rod for use in Screw Machines, with particular reference to improvements originated by the Bridgeport Brass Company.

Copper & Brass Research Assn., 25 Broadway, New York, N. Y.
Copper Roofing. Booklet. 8½ x 11 in. 32 pp. Illustrated. Gives information regarding weights of various roofing materials. Describes up-to-date practice and methods of laying copper roofs; decorative effects and how to obtain them. Gives specifications and details. Flashings, reglets, gutters and leaders, cornices and copper-covered walls.

METAL TRIM—See Doors, Windows and Trim, Metal

MORTAR COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Booklet. 3¾ x 6¾ in. 8 pp. Illustrated. Complete description of Clinton Mortar Colors with color samples.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8½ in. 16 pp. Illustrated.

S. C. Johnson & Son, Racine, Wis.
The Proper Treatment for Floors, Woodwork & Furniture. Booklet. 6¾ x 8¾ in. 32 pp. Illustrated in color. A treatise on finishing hard and soft wood in stained and enameled effects; also natural wood effects.
Portfolio of Wood Panels. 5¾ x 10¾ in. 14 pp. A portfolio containing actual panels of finished woods. Also contains valuable information on finishing and re-finishing floors and woodwork.

National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book. 5½ x 3¼ in. 100 pp. Gives directions and formulas for painting various surfaces of wood, plaster, metal, etc., both interior and exterior.
Red Lead in Paste Form. Booklet. 6¼ x 3½ in. 16 pp. Illustrated. Directions and formulas for painting metals.
Came Lead. Booklet. 8¾ x 6 in. 12 pp. Illustrated. Describes various styles of lead cames.
Cinch Anchoring Specialties. Booklet. 6 x 3½ in. 20 pp. Illustrated. Describes complete line of expansion bolts.

The Ripolin Company, Cleveland, Ohio
Ripolin Specification Book. 8 x 10½ in. 12 pp. Complete specifications and general instructions for the application of Ripolin, the original Holland enamel paint. Also directions for proper finishing of wood, metal, plaster, concrete, brick and other surfaces.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES—Continued

Ruberoid Co., The (formerly the Standard Paint Co.), 95 Madison Avenue, New York, N. Y.
Preservative Coatings. Booklet. 6 x 9 in. 15 pp. Illustrated. Presents in a concise manner the properties and uses of the Ruberoid Company's various paint preparations.

Smith & Co., Edward, P. O. Box 76, City Hall Station, New York, N. Y.
Architect's Hand Book. 4¾ x 7½ in. 24 pp. Specifications and suggestions for painting, varnishing, enameling, etc.

Sonneborn Sons, Inc., L., Dept. 4, 264 Pearl Street, New York.
Paint Specifications. Booklet. 8½ x 10¾ in. 4 pp.

The Truscon Laboratories, Detroit, Mich.
Architects' Specification Handbook. 8½ x 11 in. 108 pp. Complete specifications covering Waterproofings, Dampproofings, Oilproofings, Technical Finishes, Steel Paints, Mill White Paints, Floor Hardeners and Varnishes.

PARTITIONS

Improved Office Partition Company, 25 Grant St., Elmhurst, L. I.
Telesco Partition. Catalog. 8¾ x 11 in. 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.
Detailed Instructions for erecting Telesco Partitions. Booklet. 24 pp. 8½ x 11 in. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.

The J. G. Wilson Corporation, 11 East 36th St., New York, N. Y.
Folding Partitions. Booklet. 8½ x 11½ in. 16 pp. Illustrated. Covers the field of folding partitions for churches, schools, hotels, clubs and public institutions.
Rolling Partitions, Hygienic and Disappearing Door Wardrobes. Booklet. 6 x 9 in. 32 pp. Illustrated. Describes rolling partitions, particularly in churches and schools, and wardrobes as installed in schools and public institutions.

PARTITIONS, WIRE

Page Steel & Wire Company, Bridgeport, Conn.
Page Standard Panel Partition. Booklet. 8½ x 11 in. 6 pp. Illustrated. Uses and advantages of Wire Partition, with Page Standard Panel Specifications. Valuable to architects.

PIPE

American Brass Company, Waterbury, Conn.
Illustrated pamphlet giving tables of weights and price-lists devoted to Brass and Copper Pipe in iron pipe and plumbers' sizes.

A. M. Byers Company, 235 Water St., Pittsburgh, Pa.
Bulletin 26-A. "What is Wrought Iron?" 8 x 10¾ in. 40 pp. Illustrated. Descriptions of materials and processes employed in manufacturing Byers genuine wrought iron pipe. Factors influencing corrosion. Gives table of pipe sizes, weights, dimensions, tests, etc., and tabulated records of the life of iron and steel pipe in various kinds of service.
Bulletin 30. An Investigation of Pipe Corrosion in Hot Water Service. 8 x 10¾ in. 20 pp. Illustrated. Shows service records of iron, steel and brass pipe used for hot and cold water supply lines in 129 Pittsburgh Apartment Buildings.
Bulletin 32. Corrosion of Wrought Iron, Cast Iron and Steel Pipe in House Drainage Systems. 8 x 10¾ in. 32 pp. Illustrated. Data obtained through investigations conducted in New York and Chicago by Dr. Wm. P. Gerhard, C.E., and Thomas J. Claffy, Asst. Chief San. Inspector, city of Chicago.
Bulletin 38. The Installation Cost of Pipe. 32 pp. 8 x 10¾ in. Illustrated. Cost analyses of 20 different pipe installations, in power and industrial plants, office buildings, hotels, residences, etc.

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "A." 4 x 6½ in. 706 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

National Tube Co., Frick Building, Pittsburgh, Pa.
National Bulletin No. 11, History, Characteristics and Advantages of National Pipe. Catalog. 8½ x 11 in. 48 pp. Illustrated.

Reading Iron Company, Reading, Pa.
Reading Genuine Wrought Iron Pipe in the Making and in Service. Bulletin No. 1. 8½ x 11 in. 32 pp. Illustrated. History of the Reading Iron Company. Origin of wrought iron—description of each process of manufacture of both buttweld and lapweld pipe—Reading Pipe in various fields.
Book of Standards. Booklet. 5 x 7 in. 48 pp. Illustrated. Complete tables showing dimensions, tests and list prices on each of the 552 different kinds of Reading Tubular goods. Two simple tests for distinguishing genuine wrought iron pipe.
The Painted Molecule. Booklet. 4 x 9 in. 8 pp. Illustrated. A brief, non-technical description of the reasons for the longer life of Reading Iron Pipe, with instances of actual service.
The Ultimate Cost. Booklet. 5½ x 7¼ in. 24 pp. Illustrated in two colors. A comparison in actual figures of the initial cost and the ultimate cost of plumbing and heating systems in several kinds of homes.

PLUMBING EQUIPMENT

American Brass Company, Waterbury, Conn.
Benedict Nickel. Illustrated pamphlet descriptive of Benedict Nickel White Metal for high-grade plumbing fixtures.

A. P. W. Paper Company, Albany, N. Y.
The Onliwon Cabinet and Paper. Booklet. 5½ x 3½ in. 24 pp. Illustrated. Contains descriptions, illustrations and specifications of cabinets for serving Onliwon toilet paper and Onliwon paper towels.

Bridgeport Brass Company, Bridgeport, Conn.
Plumbing Supplies. Booklet. 10½ x 8 in. 20 pp. Illustrated. Describes a few of the different plumbing supplies manufactured by the Bridgeport Brass Company.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 66*

PLUMBING EQUIPMENT—Continued

Brunswick-Balke-Collender Co., 623 S. Wabash Avenue, Chicago, Ill.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 4 pp. Illustrated.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 8 pp. Illustrated.

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "M." 9¼ x 12 in. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Crane Company, 836 S. Michigan Avenue, Chicago, Ill.
Crane Products in World Wide Use. Catalog. 5 x 9½ in. 24 pp. Illustrated.
Plumbing Suggestions for Home Builders. Catalog. 3 x 6 in. 80 pp. Illustrated.
Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6¼ in. 43 pp. Illustrated.

Eljer Company, 15 E. Van Buren St., Chicago, Ill.
The Standardized Sixteen. Booklet. 3¾ x 6¾ in. 32 pp. Illustrated. Describes fully the complete Eljer line of standardized plumbing equipment, with diagrams, weights, measurements and copious illustrations.

Kohler Co., Kohler, Wis.
Catalog F. 7½ x 10⅝ in. 216 pp. Illustrates and describes the complete line of Kohler trade-marked plumbing ware.
Roughing-In Measurement Binder, 5 x 8 in., containing loose-leaf sheets on all staple fixtures.

Maddock's Sons Co., Thomas, Trenton, N. J.
Highest Grade Standardized Plumbing Fixtures for Every Need. Catalog. 5 x 7½ in. 94 pp. Illustrated. Covers the complete line.
Bathroom Individuality. Booklet. 6 x 9 in. 28 pp. Illustrated. Showing view of complete bathrooms with complete descriptions of floor plans.
Specifications for plumbing fixtures. Booklet. 9 x 12 in. 8 pp. Tables of specifications for industrial buildings, schools, apartments, hotels, etc.

Speakman Company, Wilmington, Del.
Speakman Showers and Fixtures. Catalog. 4½ x 7½ in. 250 pp. Illustrated. Catalog of Modern Showers and Brass Plumbing Fixtures, with drawings showing layouts, measurements, etc.
Toned Up In Ten Minutes. Booklet. 7½ x 10½ in. 16 pp. Illustrated. Modern Showers and Washups for Industrial Plants, showing the sanitary method of washing in running water.

Wolff Manufacturing Company, 255 No. Hoyne Ave., Chicago, Ill.
Plumbing Suggestions. Catalog. 3¼ x 6 in. 50 pp. Illustrated. Illustrating, describing and pricing Wolff Quality Plumbing Fixtures for residential installation.

PUMPS

Goulds Mfg. Co., The, Seneca Falls, N. Y.
Set of Twenty Bulletins. 7½ x 10½ in. 12 to 32 pp. each. Illustrated. Covers complete line of power and centrifugal pumps for all services.
Catalog "K." 6 x 9 in. 216 pp. Illustrated. Covers complete line of smaller size pumps.

RAMPS

Ramp Buildings Corporation, 115 Broad St., New York, N. Y.
The d'Humy Motoramp System of Building Design. Booklet. 8½ x 11 in. 20 pp. Illustrated. Describes the d'Humy system of ramp construction for garages, service buildings, factories, warehouses, etc., where it is desirable to drive motor vehicles or industrial tractors under their own power from floor to floor.
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Visibility. Pamphlet. 8½ x 11 in. 2 pp. Illustrated. Discussion of visibility feature of d'Humy Motoramp System with reference to illustration of one particular installation.
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ROOFING

American Brass Company, Waterbury, Conn.
Copper Products for Roofing Purposes. Illustrated price-list devoted to copper products, including sheets and rolls, for fabricating into leaders, gutters, flashings, shingles, etc.

American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Better Buildings. Catalog. 8½ x 11 in. 32 pp. Describes Corrugated and Formed Sheet Steel Roofing and Siding Products, black, painted and galvanized, with directions for application of various patterns of Sheet Steel Roofing in various types of construction.
Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes the merits of high grade roofing tin plates and the advantages of the copper-steel alloy.

Copper & Brass Research Assn., 25 Broadway, New York, N. Y.
Copper Roofing. Booklet. 8½ x 11 in. 32 pp. Illustrated. Gives information regarding weights of various roofing materials. Describes up-to-date practice and methods of laying copper roofs; decorative effects and how to obtain them. Gives specifications and details. Flashings, reglets, gutters and leaders, cornices and copper-covered walls.

Creo-Dipt Company, 1025 Oliver St., North Tonawanda, N. Y.
Architectural Service Sheets. 8½ x 11 in. Illustrated. Working drawings of construction, with standard specifications for design and construction of same.

Illinois Zinc Company, 280 Broadway, New York, N. Y.
Corrugated Sheets of Pure Rolled Zinc. Booklet. 3½ x 8½ in. 8 pp. Illustrated. Describes methods of application for Corrugated Zinc Sheets for roofing or siding. Weights per square. Comparative gauge lists.
The Roof That's Always New. Booklet. 3¾ x 6 in. 12 pp. Illustrated. Story of Illinois Zinc Shingles, their everlasting and artistic qualities. Information regarding a complete zinc roof, shingles, starting piece, valley, ridge and hip piece.

ROOFING—Continued

Ruberoid Co., The (formerly the Standard Paint Co.), 95 Madison Avenue, New York, N. Y.
Instructions for Laying Built-up Roofs. Booklet. 8½ x 11 in. Illustrated.
Ruberoid Facts Worth Knowing. Booklet. 6 x 9 in. 16 pp. Illustrated.
Ruberoid Strip-shingle. Booklet. 3½ x 6¼ in. 16 pp. Illustrated in color.
Ruberoid Unit-shingle. Booklet. 3½ x 6¼ in. Illustrated in color.

N. & G. Taylor Company, 300 Chestnut Street, Philadelphia, Pa.
Selling Arguments for Tin Roofing. Booklet. 6¼ x 9¼ in. 80 pp. Illustrated. Describes the various advantages of the use of high grade roofing tin, gives standard specifications, general instructions for the use of roofing tin, illustrates in detail methods of application.

SAFETY TREADS

Universal Safety Tread Co., 40 Court St., Boston, Mass.
The Universal Safety Metal Tread. Booklet. 8½ x 11 in. 16 pp. Illustrated. Describes Safety Treads, with lead inserts in steel base, suitable for use on iron, wood or concrete stairs. Also the flat type, with "Alundum" surface, as well as special ladder treads for ships, power-house and engine-room open string stairways.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7½ x 10½ in. 46 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

SHEATHING

Bishopric Manufacturing Co., 103 Este Ave., Cincinnati, Ohio
For All Time and Clime. Booklet. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric stucco base and Bishopric plaster base.

STEEL DRESSERS

Janes & Kirtland, 133-135 West 44th St., New York, N. Y.
The White House Line. Booklet. 7¾ x 5¼ in. 24 pp. Illustrated. Describes and illustrates in detail WHITE HOUSE Steel Dressers and some of the separate units. Also contains typical layout and list of some of our clients.
Photographs. 5½ x 3½ in. Views of actual installations in private residences, schools, etc., sent on request.

STONE, BUILDING

Harrison Granite Company, 200 Fifth Avenue, New York, N. Y.
Harrison Granite Company, Clientele. 3¾ x 8¾ in. 24 pp. Illustrated. A partial list of clients with illustrations of examples of monuments and mausoleums.

Indiana Limestone Quarrymen's Association, Box 766, Bedford, Indiana.
Volume 3. Series A-3. Standard Specifications for Cut Indiana Limestone work. 8½ x 11 in. 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Vol. 1. Series B. Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 27. Series B. Designs for Houses of Indiana Limestone. 8½ x 11in. 32 pp. Illustrated. Being the best designs submitted in competition for a detached residence faced with Indiana Limestone conducted by *The Architectural Review.*
Volume 4, Series "B." Booklet. 8½ x 11 in. 64 pp. Illustrated. Indiana Limestone as used in Banks.

Tompkins-Kiel Marble Company, 505 Fifth Ave., New York, N. Y.
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Brasco Manufacturing Company, 5025 So. Wabash Ave., Chicago, Ill.
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Kawneer Co., The, Niles, Mich.
A Collection of Successful Designs. Catalog. 9¼ x 6½ in. 64 pp. Illustrated. Showing by use of drawings and photographs many types of Kawneer Solid Copper Store Fronts.

Zouri Drawn Metals Co., B. J. 10, Chicago Heights, Ill.
Architects' Catalog. 8¾ x 11¾ in. 86 pp. Illustrated. Showing a true copy of the approval of the Underwriters' Laboratories. Showing a proper glazing specification, based on the Underwriters' Report.
Catalog B. J. 8. 6 x 9 in. 68 pp. Illustrated. Key to Getting the People In.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 67*

Continued from page 67

STUCCO BASES

Bishopric Manufacturing Co., 103 Este Ave., Cincinnati, Ohio.
For All Time and Clime. Booklet. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric stucco base and Bishopric plaster base.

STUCCO, MAGNESITE

American Magnestone Corporation, Springfield, Ill.
Catalog. 13 pp. Describes the quality, beauty and strength of Magnestone.

American Materials Company, 101 Park Avenue, New York; Weed Street and Sheffield Avenue, Chicago, Ill.
Elastica, the Stucco of Permanent Beauty. Catalog. 8½ x 11 in. 32 pp. Illustrated. Treatise on composition and application of Elastica Stucco.

Muller & Co., Franklyn R., Waukegan, Ill.
Everlastic Magnesite Stucco. Booklet. 8½ x 11 in.

United States Materials Co., Weed Street and Sheffield Avenue, Chicago, Ill. See American Materials Co.

TELEPHONE SYSTEMS

Federal Telephone & Telegraph Company, 1738 Elmwood Ave., Buffalo, N. Y.
Catalog No. 610. Booklet. 8½ x 10 in. 24 pp. Illustrated. Interior telephones for home, office, factory, hotel and apartment-house use.

TERRA COTTA

Atlantic Terra Cotta Co., 1170 Broadway, New York, N. Y.
Questions Answered. Booklet, 7½ x 5½ in. 32 pp. Illustrated. A synopsis of questions most frequently asked by architects in relation to terra cotta, with brief but complete answers; contains many illustrations.

National Terra Cotta Society, 1 Madison Avenue, New York, N. Y.
Standard Construction, Indexed, bound volume. 10½ x 16 in. 90 pp. 70 Illustrations. Standard forms of terra cotta construction with short article.
"The School." 10½ x 13½ in. 34 pp. 92 Illustrations. Types of school buildings with short descriptive articles. Volume I, brochure series.
"Better Banks." 10½ x 13½ in. Illustrated. Banks of various sizes, with short descriptive articles.
"Terra Cotta Defined." 10½ x 13½ in. Complete description of Terra Cotta and its uses.

The New Jersey Terra Cotta Co., Singer Bldg., New York, N. Y.
Store Fronts in Architectural Terra Cotta. Booklet. 8½ x 11 in. 44 pp. Illustrated. Photographs, measured drawings, designs and illustrations of decorative motifs make up an interesting booklet which will be forwarded upon request.

Northwestern Terra Cotta Co., The, 2525 Clybourn Ave., Chicago, Ill.
Booklet. 8½ x 11 in. 77 pp. Illustrated. Showing in a concise way the usefulness of terra cotta.

THERMOSTATS—See Heating Equipment

TILE, FLOOR AND WALL

Associated Tile Manufacturers, The, Beaver Falls, Pa.
Bring the Crowds to Your Market. Booklet. 8½ x 11 in. 16 pp. Illustrated. The use of Tile for the modern sanitary market.
Swimming Pools. Booklet. 8½ x 11 in. 32 pp. Illustrated. A handbook on swimming pools and their construction.

TILE, HOLLOW

Hollow Building Tile Association, Dept. 1812, Conway Bldg., Chicago, Ill.
Handbook of Hollow Building Tile Construction. 8½ x 11 in. 104 pp. Illustrated. Complete treatise on most approved methods of hollow tile building construction and fireproofing.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11 in. 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Industrial Housing Bulletin 172. 8½ x 11 in. 14 pp. Illustrated. Photographs and floor plans of typical workingmen's homes.
Natco on the Farm. 8½ x 11 in. 38 pp. Illustrated. A treatise on the subject of fire safe and permanent farm building construction.
Fireproof Buildings of Natco Hollow Tile. Booklet. 8½ x 11 in. 16 pp. Illustrated. Showing the use of Natco Hollow Tile for private residences.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
No. 50 Steam Pocket Catalog. 4 x 6½ in. 775 pp. Illustrated. Describes the complete line of the Crane Co.

Jenkins Bros., 80 White Street, New York.
The Valve Behind a Good Heating System. Booklet. 4½ x 7½ in. 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
Jenkins Valves for Plumbing Service. Booklet. 4½ x 7½ in. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

Burlington Venetian Blind Co., Burlington, Vt.
Venetian Blinds Booklet. 4½ x 7½ in. 32 pp. Illustrated. Describes the "Burlington" Venetian blinds, method of operation, advantages of installation to obtain perfect control of light in the room.

VENTILATION

Clarage Fan Company, Kalamazoo, Mich.
Catalog No. 52. 8½ x 11 in. 84 pp. Illustrated. Describes Clarage Kalamazoo Multiblade Fans and Heaters for use in schools, churches, hospitals and industrial plants. Engineering data, capacity tables and dimensions included.

WALL BOARDS

Carey Co., The Philip, Cincinnati, Ohio.
Carey Board for Better Building. Catalog. 6 x 9 in. 32 pp. Illustrated.

United States Gypsum Company, 205 West Monroe St., Chicago, Ill.
Walls of Worth. Booklet. 8½ x 11 in. 24 pp. Illustrated. Describes Sheetrock, the fireproof wall board, its advantages and uses.

WATERPROOFING

Ruberoid Co., The, 95 Madison Ave., N. Y.
Impervite. Circular. 8½ x 11 in. 4 pp. Illustrated. An integral waterproofing compound for concrete, stucco, cement, mortar, etc.

Sandusky Cement Co., Dept. F., Cleveland, Ohio.
Medusa Waterproofing. Booklet. 6¾ x 9 in. 38 pp. Illustrated.

The Truscon Laboratories, Detroit, Mich.
Science and Practice of Integral Waterproofing. 4 x 9 in. 33 pp. Illustrated. Discusses why concrete requires waterproofing and properties an integral waterproofing must possess. Full specifications for waterproofing mass concrete, cement stucco and cement plaster coat.

WATER PURIFIERS

Wallace & Tiernan Company, Newark, N. J.
Protecting N. Y. Water Supply. Booklet. 10 x 7 in. 24 pp. Illustrated. Describes the chlorinating equipment used for sterilizing N. Y. City water supply; also equipment suitable for sterilizing water supplies of municipalities, industrial plants, private residences, etc.

WATER SOFTENERS

Permutit Company, The, 440 Fourth Ave., New York, N. Y.
Permutit-Water softened to No (Zero) Hardness. Booklet. 8½ x 11 in. 32 pp. Describing the original Zeolite process of softening water to zero hardness. An essential for homes, hotels, apartment houses, swimming pools, laundries, textile mills, paper mills, ice plants, etc., in hard water districts.

WINDOW HARDWARE

American Chain Company, Inc., Bridgeport, Conn.
American Sash Chain. Booklet. 3½ x 6 in. 8 pp. Illustrated. Describes and illustrates American Sash Chain and Sash Fixtures.

The Kawneer Company, Niles, Mich.
Kawneer Simplex Windows. Catalog. 8½ x 10½ in. 16 pp. Illustrated. Complete information, with measured details, of Kawneer Simplex Weightless Reversible Window Fixtures, made of solid bronze. Shows installations in residences and buildings of all sorts. Detail Sheets and Installation Instructions. Valuable for architects and builders.

Samson Cordage Works, Boston, Mass.
Catalog. 3½ x 6½ in. 24 pp. Illustrated. Covers complete line.

Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Booklet. 6¾ x 9 in. 42 pp. Illustrated. Covers a complete line of chains, hardware and specialties.

WINDOWS, CASEMENT

Crittall Casement Window Co., 2703 East Atwater Street, Detroit, Mich.
Catalog No. 18. 9 x 12 in. 56 pp. Illustrated.

Hoffman Mfg. Co., Andrew, 900 Steger Building, Chicago, Ill.
Hoffman Casements. Architects' Portfolio. 8½ x 11 in. Loose-leaf. Large scale working details for mill-work and installation.
F. S. Details 20 x 23 in. and 15 x 22 in. Working details for mill-work and installation.
Hoffman Casements Catalogue. 7 x 8½ in. 16 pp. Illustrated.

Hope & Sons, Henry, 103 Park Avenue, New York.
Catalog. 12¼ x 18½ in. 30 pp. Illustrated. Full size details of outward and inward opening casements.

International Casement Company, Jamestown, N. Y.
International Casements. Catalog. 8½ x 11 in. 224 pp. Illustrated. Valuable book, containing photographs and measured drawings of all types of buildings, showing casement windows.

David Lupton's Sons Co., Allegheny Ave. and Tulip St., Philadelphia, Pa.
Lupton Service—Products No. 11. Book. 8½ x 11 in. 192 pp. Illustrated. The full line of Lupton products described and illustrated. Separate chapter on Designing Service. Many new types of steel sash for apartments, hotels, etc., shown.
Catalog No. 110. 8½ x 11 in. 72 pp. Illustrated. A condensed version of the No. 11 or general catalog. The new Lupton Projected Sash completely described.
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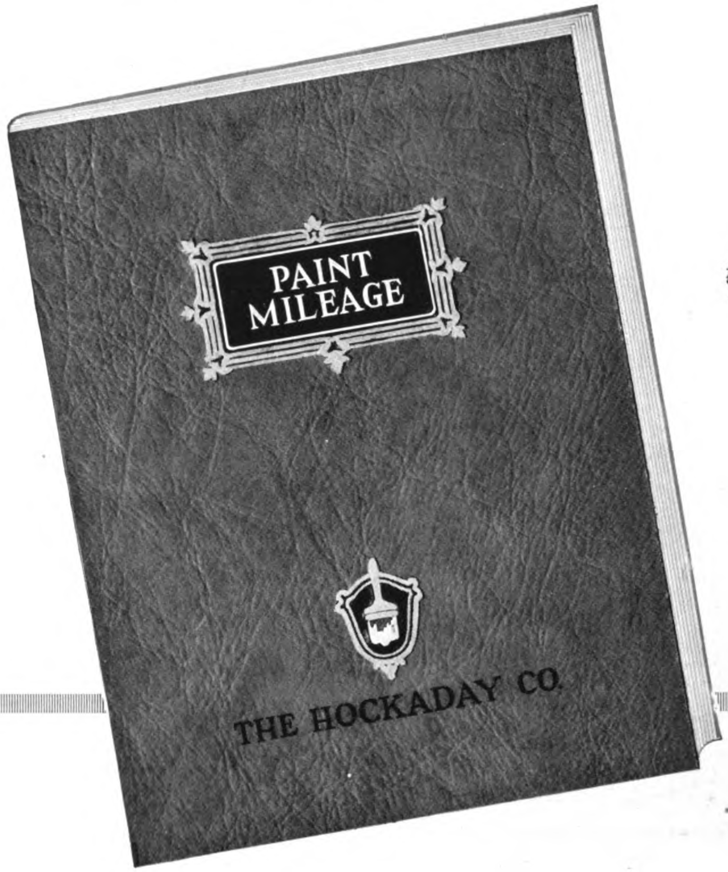
WIRE

Page Steel & Wire Company, Bridgeport, Conn.
American Ingot Iron Wire, Electrical and Mechanical. Booklet. 4 x 6½ in. 32 pp. Illustrated. Presents in convenient form data and tables pertaining to the properties of American Ingot Iron Wire. Listed in parallel columns for ready comparison with other commercial wire.



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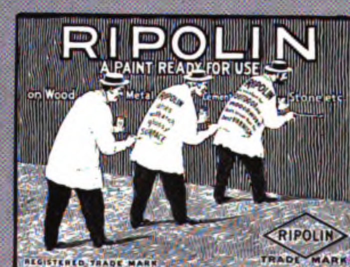

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Architect: Charles Barton Keen
National Military Home,
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Cadet Hospital,
West Point, N. Y.
Architect: Arnold Brunner.
Navy Hospital,
Pelham Bay Park, N. Y.
Mary Imogene Bassett Hospital,
Cooperstown, N. Y.
Architect: F. P. Whiting.
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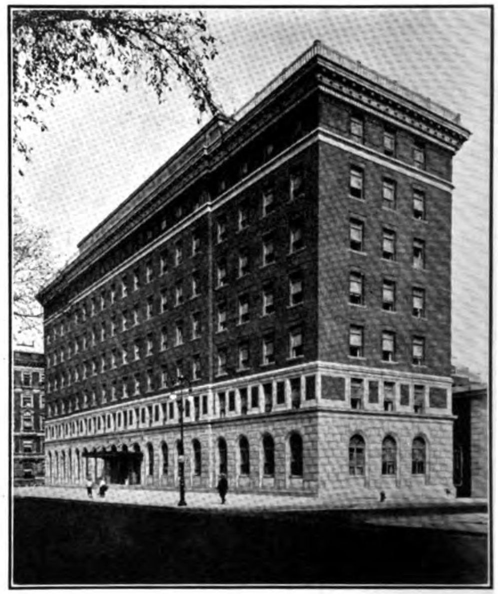

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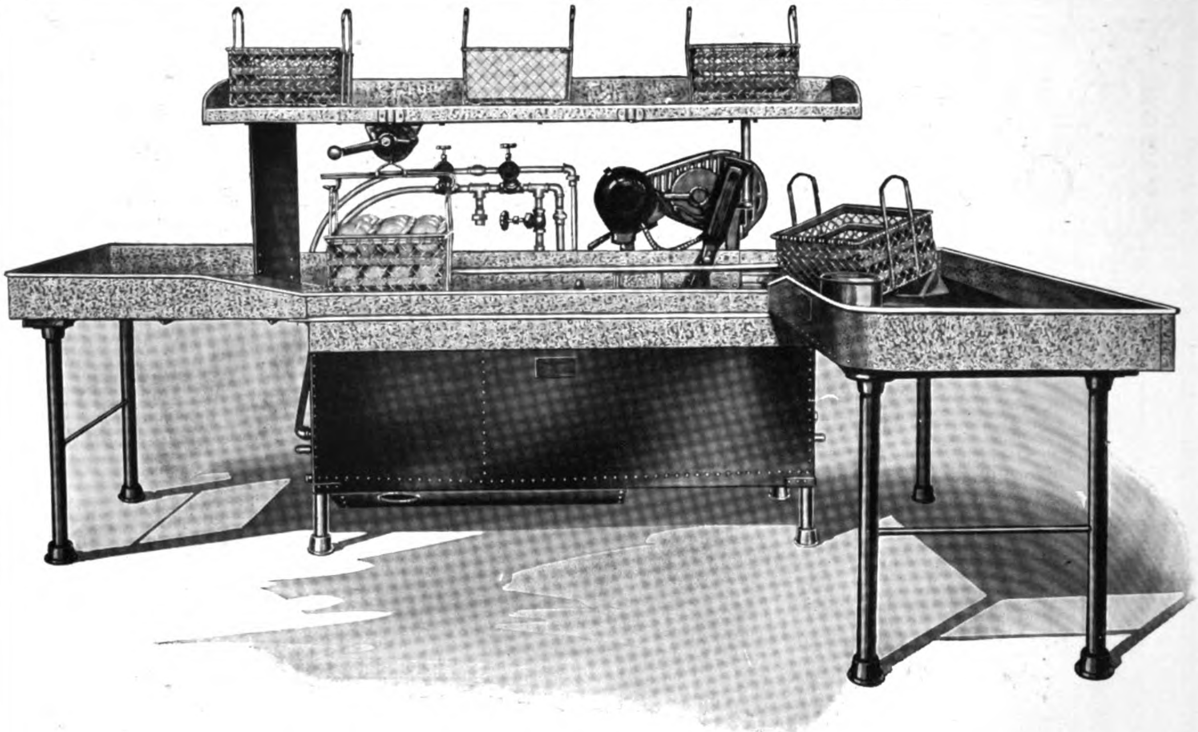

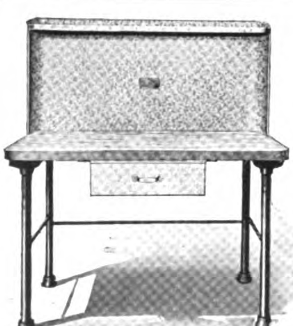

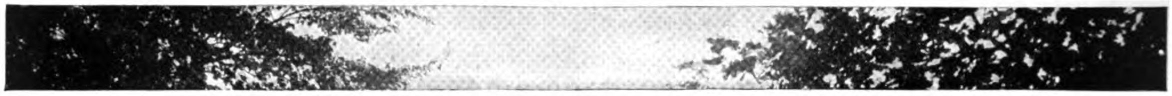

A TREATMENT FOR MAKING HOSPITALS QUIET

Mount Sinai Hospital, situated on one of the noisiest traffic streets in Cleveland. Here over 100 rooms were made quiet by Johns-Manville Acoustical Correction.

PHYSICIANS are agreed that rest is a great healer. It follows that whatever promotes quiet has much to do with the ease of the patient and his recovery.

This explains why Johns-Manville Acoustical Correction is being recognized as of vital importance in modern hospital construction.

Acoustical Correction deadens noise. It hushes the moans of sufferers, which are so unnerving. It stills the rattle of dishes from service rooms, the hum of voices in corridors and the roar of street traffic—so that doors and windows may be left open without disturbance to the patient.

What the treatment is

Acoustical Correction subdues noise because it absorbs the sound waves. A specially prepared felt is the base of the treatment. This felt is applied against the ceilings or upper wall surfaces. It is then covered with a tightly stretched membrane and treated with a sanitary coating which can be kept as clean as a plaster surface.

The treatment in no way detracts from the appearance of the room. The difference is to the ear.

But the benefits from quiet need no further argument. Acoustical Correction provides the means—and Johns-Manville stands ready to help plan an installation at your convenience.

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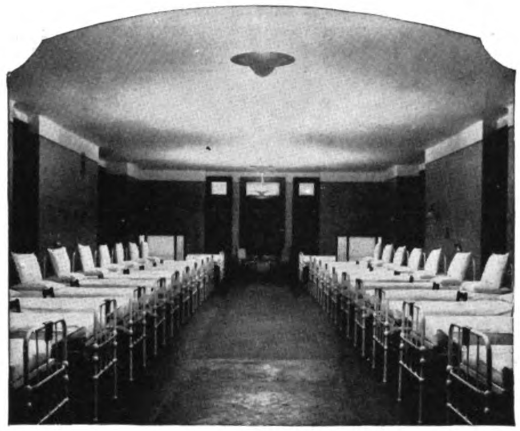
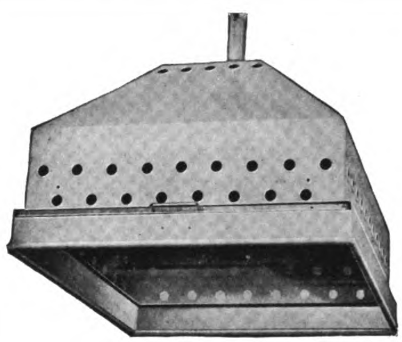


The hardest problems in hospital lighting solved



Frink Operating Table Reflector

Another problem in hospital lighting is the operating table. On this must be concentrated an intense illumination accomplished *without* a corresponding increase of heat.

Frink Operating Table Reflectors are now being used by the majority of the first class hospitals in the country. They throw on the table a light of over 50 foot-candles, yet so effective is the automatic ventilating features that the temperature *at the lower plate* is not more than 8 degrees above that of the room, after an hour's operation.

ORDINARY "indirect" lighting often leaves a glaring spot over the fixture that is only less irritating to the weakened eyes of patients than a directly exposed source of light.

The Frink System of Hospital Lighting includes ward lights so designed as to distribute evenly diffused light over a large area of the ceiling and whence it is redirected and *really* diffused throughout the room. The result is an ample, yet soft and restful, light.

Catalog 421 describes fully the various types of this and other Frink units for the scientific illumination of the modern hospital, including:

Frink Adjustable Bed Lights
Frink Dustless Ward Reflectors
Frink Microscopic Reflectors
Frink Night Floor Lights
Frink Operating Table Reflectors

Frink Lighting Systems are features of such splendid hospitals, large and small, as:

Atlantic City Hospital, Atlantic City, N. J.
Homeopathic Hospital, Boston, Mass.
Chicago Municipal Tubercular Hospital, Chicago
Mount Sinai Hospital, New York City
St. Vincent's Charity Hospital, Cleveland, Ohio
U. S. Government Hospital, Colon, Panama
Ralston Hospital, El Paso, Texas
Presbyterian Hospital, New York City
St. Mary's Hospital, Hoboken, N. J.
Military Hospital, Halifax, Nova Scotia
Cambria Steel Company Hospital, Johnstown, Pa.
Bellevue Hospital, New York City
Children's Hospital, Los Angeles, Calif.
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C. C. Benton Hospital, Wilson, N. C.
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The Frink Engineering Department is always ready to work in closest harmony with the architect.

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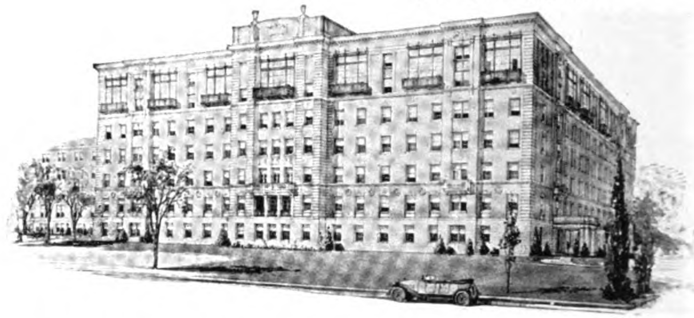
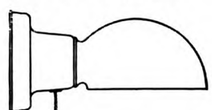
For Better Illumination

Brascolites of Special Hospital design furnish the general illumination in the operating room.

Let us send you copy of our descriptive booklet showing special types of hospital lighting equipment.

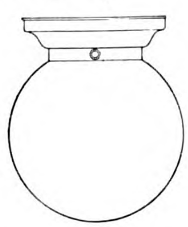


New surgical pavilion of St. Mary's Hospital, Rochester, Minn. Architect: Clarence H. Johnston (State Architect), St. Paul, Minn. Contractors: Heffron & Fitzgerald, Rochester, Minn. Electrical Contractors: Rochester Electric Co., Rochester, Minn.

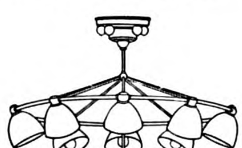


AGLITE—Special all-glass bracket fixtures—used on the walls of bedrooms.

Special porcelain enameled flange fixture with Monax Urns for bedroom ceilings.



Corridors are lighted with these special Opal Ball fixtures equipped with signal and service lights.



Scanlan-Morris Noshadowlite—made in Brascolite factory—for direct illumination over operating tables. These fixtures are also used in the Mayo Clinic Building

Wins Again!

In St. Mary's Hospital, Rochester, Minn.—where the utmost in efficiency is demanded—and where lighting, as the servant of science and skill, is called upon to respond to the most exacting requirements, Brascolites—and auxiliary fixtures of special design made in the Brascolite plant—have been installed throughout.

The architects and engineers made numerous and exhaustive tests to determine the right light to use. Fixtures of both domestic and foreign make were tried out.

Efficiency, Economy and Decorative Value. It was these distinctive features of Brascolite illumination—plus the adaptability of the Brascolite principle to any architectural design—that led to the selection of Brascolite for this great institution. Prominent hospitals throughout the country are being completely equipped with Brascolite and Aglite fixtures.

Through a careful study of modern hospital illumination we are prepared to furnish lighting fixtures to meet every requirement—a special type for every need.

Our Designing and Engineering Departments are at your service, without obligation, for any special requirements.

The Brascolite Company - St. Louis, U.S.A.

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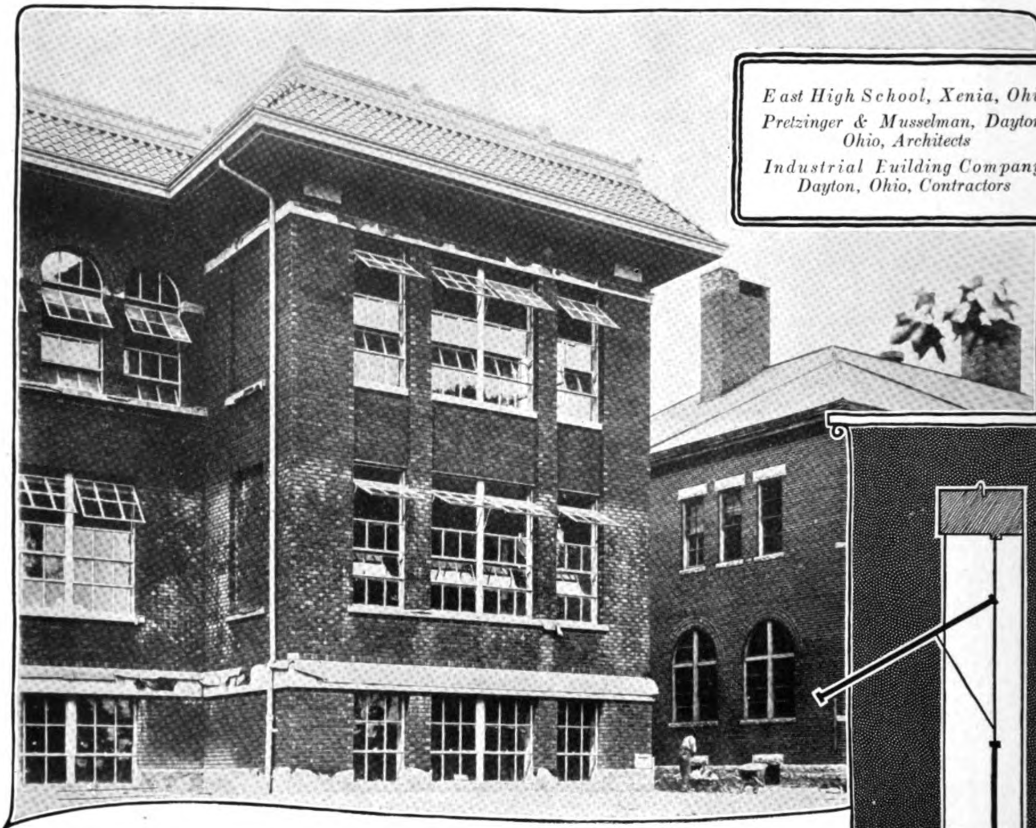
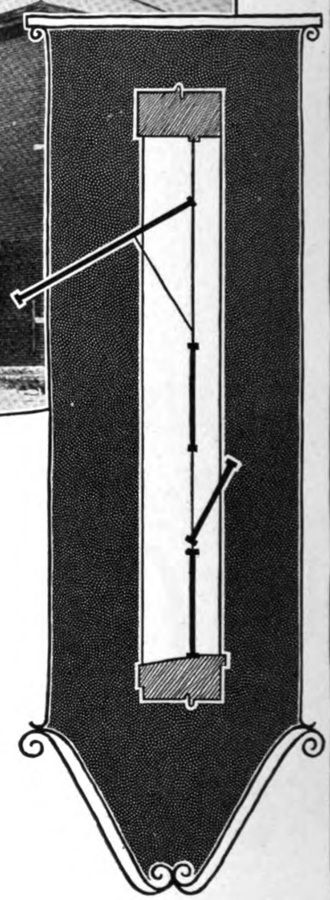


East High School, Xenia, Ohio
Pretzinger & Musselman, Dayton, Ohio, Architects
Industrial Building Company, Dayton, Ohio, Contractors



ONE glance at these two school buildings proves the value of Fenestra Reversible Ventilator Windows.

In the new building, they contribute largely to its architectural superiority. They brighten its classrooms and provide better ventilation. Smoothly operating ventilators, additional fire protection, permanence and lower maintenance costs are other advantages.

The cross section drawing shows how the large, top ventilator swings out, eliminating impure air. The lower one pivots in, admitting pure, fresh air and acting as a draught guard.

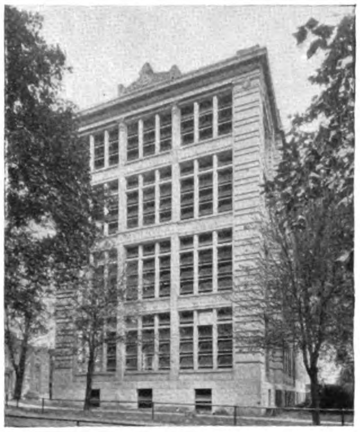
Learn how you can employ Fenestra to advantage. A complete, illustrated catalog is yours for the asking. Dictate a note today.

Detroit Steel Products Company
2601 East Grand Boulevard Detroit, Mich.
"The World's Largest Manufacturers of Steel Windows"

Fenestra

Lupton Projected Sash (special) in Akron City Hospital, Akron, O.

F. W. Striebinger
Architect



For Hospitals and Schools

Outdoor air with indoor shelter — that describes the hospital ventilated with Lupton Projected Sash.

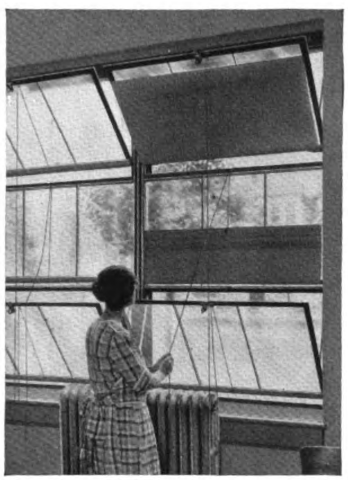
No drafts, because no concentrated air currents. On windy days opening each ventilator a trifle gives an even, draftless change of air.

The ventilators are balanced and held by friction at any degree of opening. By reversing them they can be washed from inside. They fit closely when shut, and do not rattle.

Made to open "in-at-top" or "out-at-bottom," as specified. As good for schools and offices as for hospitals.

Use standard sizes when possible. They cost less.

See catalogues No. 110 or No. 11—in your files.



Standard type of Lupton Projected Sash. Made to open "in-at-top" or "out-at-bottom" of ventilators as specified. Photograph shows use of separate shades.

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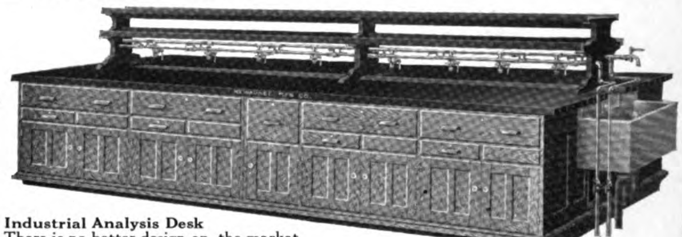

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Because of our line of over five hundred standardized designs it is seldom necessary to plan special equipment if you choose Kewaunee. You will find that we have already met nearly every possible laboratory need with a standard desk, table, bench or sink.

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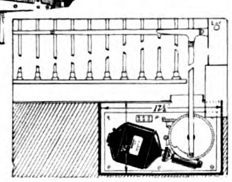

Showing installation of sliding type of Varnum Engine — with connecting arms.

VARNUM Door Engines open and close doors as silently and easily as Ali Baba's "Open Sesame" moved the door to his treasure cave. By a mere touch upon a conveniently located electric switch, the Varnum Engine quickly opens or closes both sliding and swinging doors, automatically locking them shut. Varnum Engines may be installed out of sight. They are used extensively on grille doors or gates in front of Safe Deposit Vaults. They add to Banking Service and assure absolute protection. Send for blue prints and catalogue.

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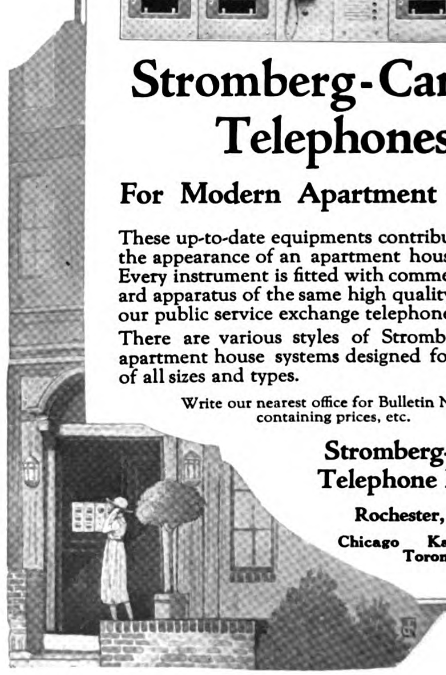

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This Fire-Retardant, Crack-Preventing Plaster Base and Reinforcing Logically Indicated in Large and Small Work

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SUSPENDED CEILINGS in these two Hospitals —(above) Masonic Hospital, St. Louis, Architect, F. C. Bonsack; (below) Mt. Sinai Hospital, Cleveland, Architects, George B. Post & Sons — were constructed with KNO-BURN lath.

Most architects are very familiar with the economical, small diamond meshed *Kno-Burn* lath, but it is always a pleasure to send—

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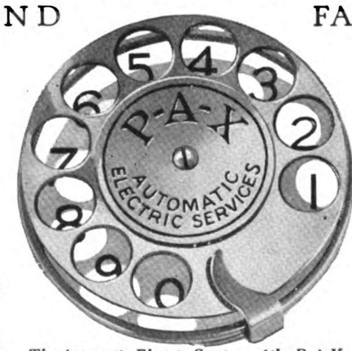

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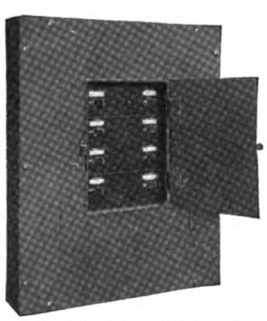

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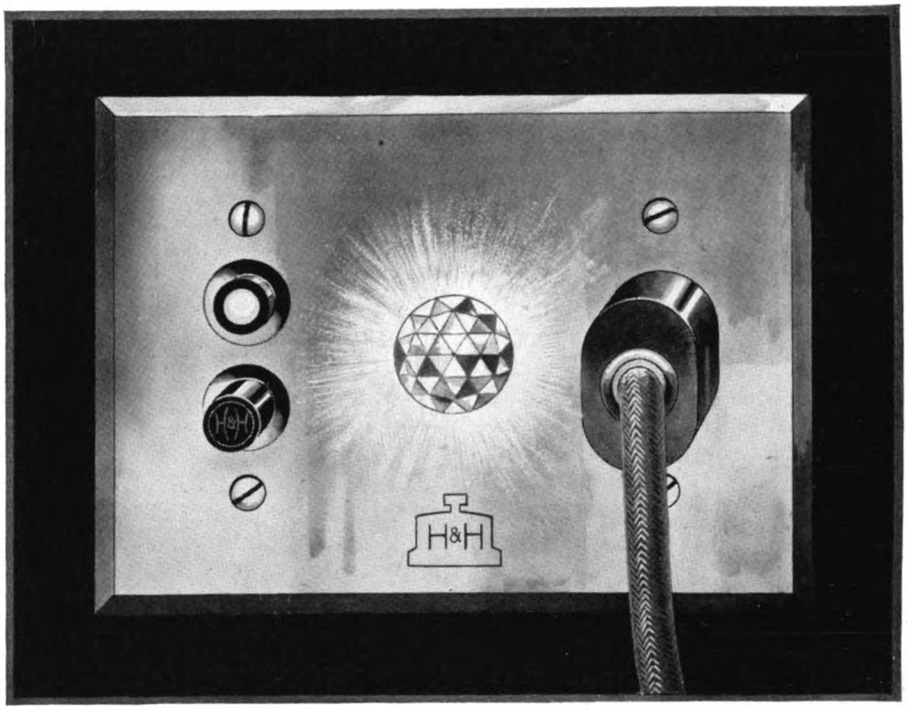
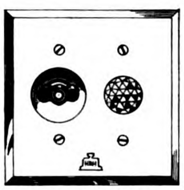


Current "on" or "off"—*told at a glance*



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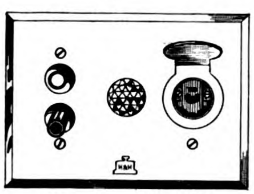

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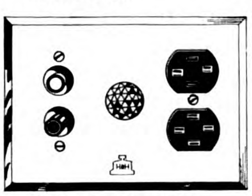

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Many heating and other electrical appliances do not visibly indicate when current is on. Users forget they did not turn off the current. And the only reminder is that which comes too late—the odor of burning insulation. Many times such occurences result not merely in the destruction of the heating appliance. Serious fires are started, endangering life and property.

Everywhere electric appliances are used—and especially in public institutions where absolute safety should be paramount—foresight and caution suggest that the use of "H & H" Warning Lights be provided for in plans for new buildings or electrical improvements.

Wonderfully Convenient for Hospital Service

When the current is "on", a candelabra lamp gleams through the ruby, cut-glass bulls-eye, a warning signal that the current is ON, and, if not needed, should be turned off. Location of lamp is clearly shown in illustration at left of this paragraph. Hinged base permits easy lamp replacement.

"H & H" Warning Lights are largely used not only in connection with outlets for heating appliances, but also in circuits feeding lights which, because located in out-of-the-way places, might be left burning unnoticed; and on circuits controlling stationary vacuum cleaners.

Available in many combinations with switches and receptacles of various types, and in the usual ampere capacities and voltage ratings.

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Hartford Connecticut

H&H

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When a radiator valve leaks—who is to blame?

EVERYONE knows that the old-fashioned stuffing box radiator valve is bound to wear leaky.

It is true that the damage that these leaks cause can usually be prevented by repacking the valves every year.

But there is a safer and more economical way to give real protection from leaks.

When IDEAL PACKLESS VALVES are installed, leaks are a thing of the past. The metal bellows (shown below) is tight, and steam, water or even air cannot pass it. This ends expensive repair work forever.

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That is one of the reasons why so many architects are now specifying IDEAL PACKLESS VALVES exclusively.

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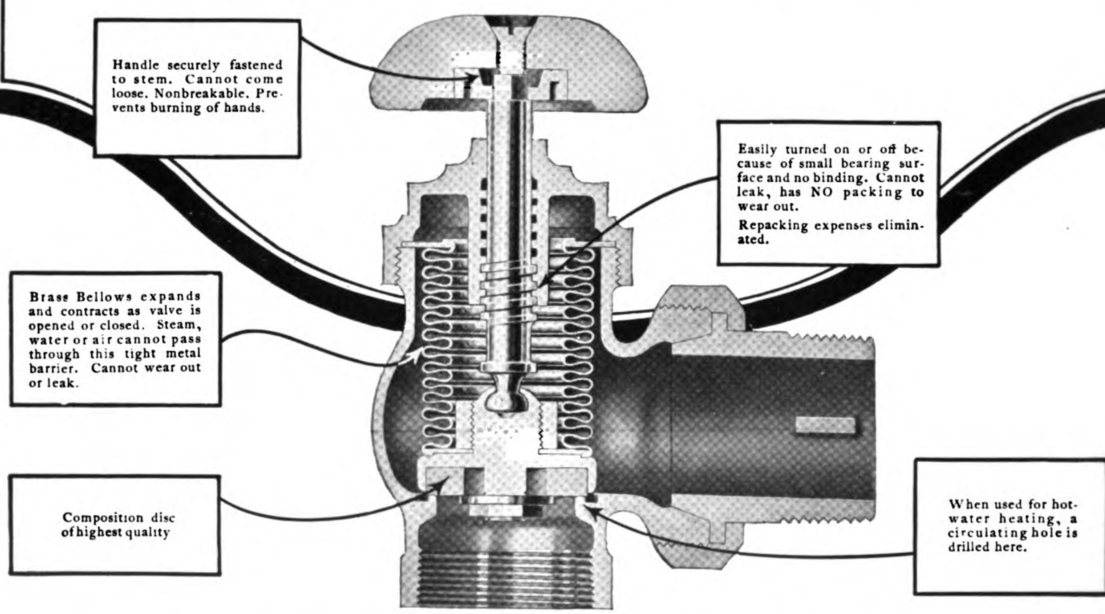
You can get IDEAL PACKLESS VALVES from any Heating Contractor or from the nearest Branch of this Company.



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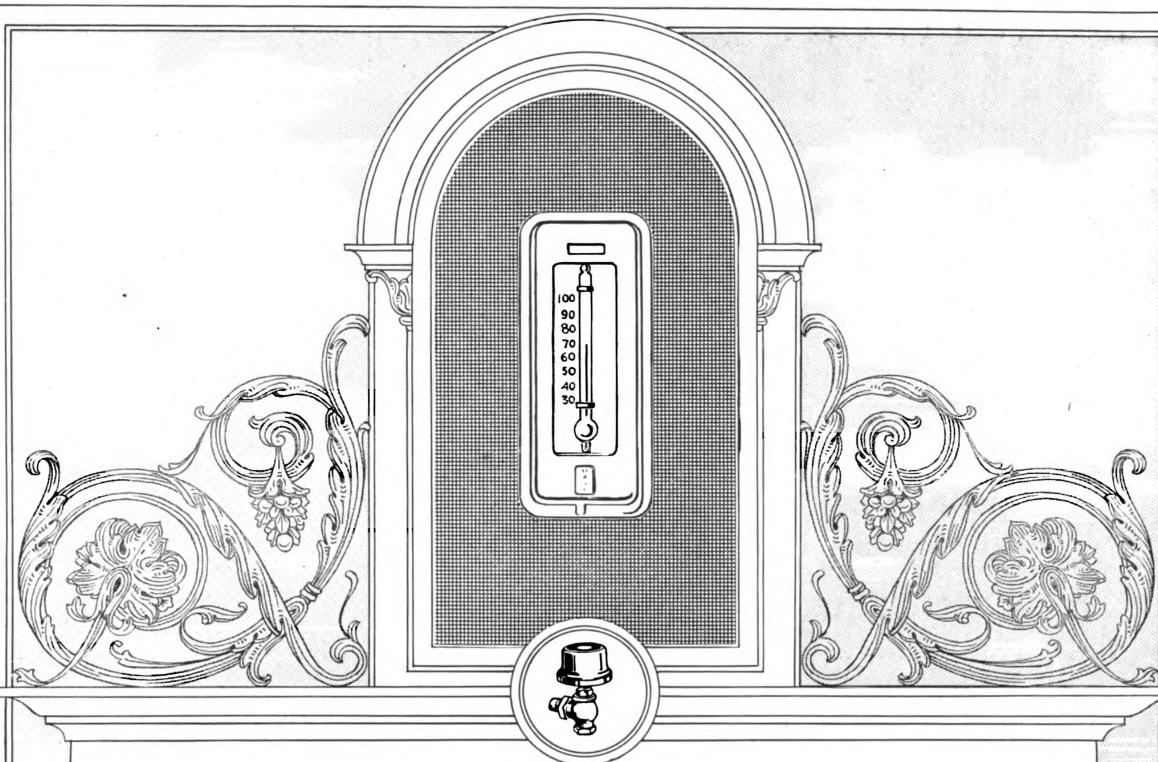
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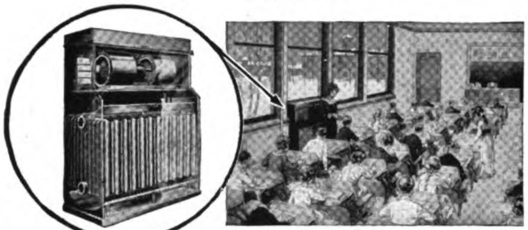

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There are no uncleanable ducts or flues. Each Univent draws fresh air directly from outdoors, heats it and thoroughly diffuses it throughout the room. Wind or weather makes no difference in the operation of the noiseless Univent system. It is positive.

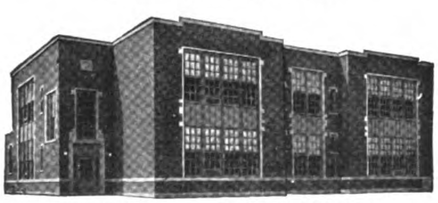
Tests have proven that good ventilation in schools increases mental alertness of pupils and teachers 33⅓% and decreases sick leave 50%.

Univent installation cuts down building costs and saves space because no ducts or flues are necessary. For the same reason Univent air is purer than air traveling through long, dust-laden ducts. The Univent is designed for schools and all buildings where mechanical ventilation is necessary.

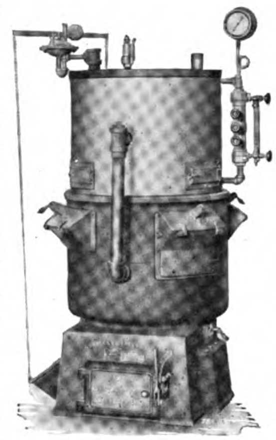
Having determined upon a Univent System the Architect can prepare his preliminary sketches without further thought to heating and ventilating, knowing that he will not have to tear down his building to install it, or be handicapped in meeting his estimate cost by addition of space or expensive construction.

Send for a copy of our 72-page Architects' and Engineers' edition "Univent Ventilation" or, better still if you have a ventilation problem, send us sketches or blue prints and let us make specific recommendations and estimate of cost. No obligations.

THE HERMAN NELSON CORPORATION
Dept. B, *Moline*, Illinois



TONOWANDA DISTRICT SCHOOL, BUFFALO, N. Y.
HAS COMPLETE UNIVENT INSTALLATION
Bley & Lyman, Architects, Buffalo, N. Y.



Durability

of the **Gorton Self-Feeding Boiler** is demonstrated by the fact that many of the boilers installed over 25 years ago are still in use giving entire satisfaction.

Efficiency

The **Gorton Self-Feeding Boilers** are built on the lines of Power Boilers, using the same material, thus securing the greatest Strength, Durability, and highest Efficiency.

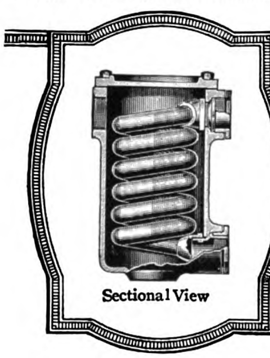
The **Gorton Self-Feeding Boiler** gives a steady heat with attention only morning and night; its construction insures complete combustion of the gases and prevents the waste of coal.

See pages 2, 3, 4, 6, 8, 10, 11, and 13 of Catalog No. 88.

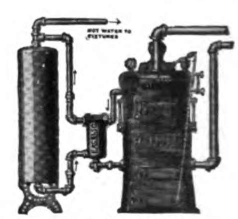
OUR NEW NO. 88 CATALOG IS READY—WILL BE SENT UPON REQUEST

Gorton & Lidgerwood Co.
96 Liberty Street, New York

All Gorton Self-Feeding Boilers built to the "A. S. M. E. Standard"



Sectional View



Typical Installation

Specify Excelso—and be sure

of giving your client hot water with no extra cost for fuel during the heating season. Heating Plants—steam or vapor—will generate the household supply economically. Excelsos are endorsed and sold by all the leading boiler manufacturers on a money back guarantee.

SEE OUR CATALOG IN SWEET'S

Write for our Free Booklet which contains full information about Excelso Heaters, the first in the field.

EXCELSO SPECIALTY WORKS
205 Excelso Building Buffalo, N. Y.

EXCELSO WATER HEATERS
Sold by All Plumbers and Steamfitters

BUILT ON HONOR—

IN the hospital wherever water must be delivered at a predetermined temperature and pressure it is not only essential but vitally necessary that the temperature and pressure be accurately controlled.

The whole thought behind each "Leonard" valve is: "It must live up to a promise."

Every "Leonard" Thermostatic Water Mixing Valve is built on honor, sold on honor and must perform its function in an honorable manner under the most severe working conditions. That is why each valve comes to you with a two-year guarantee.

There is a "Leonard" valve suited to your work, and that you can depend upon.

Write for specification book.

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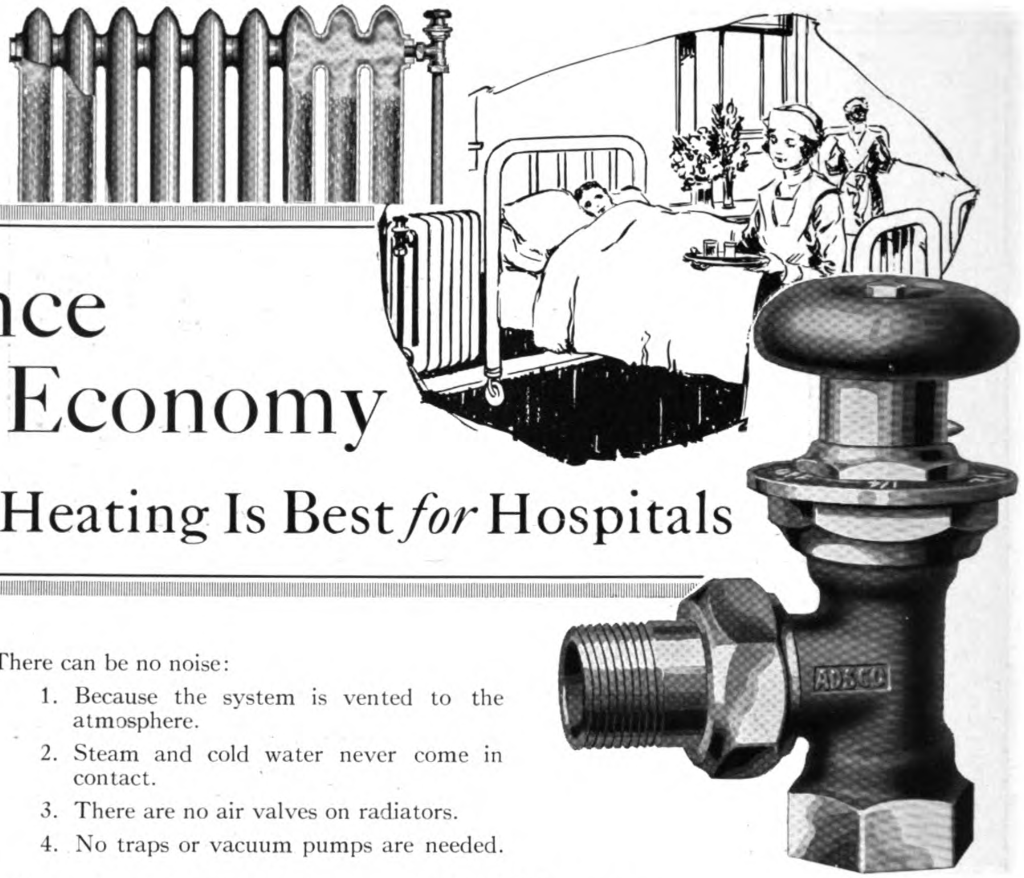
Providence, R. I.



Silence and Economy

Adsco Heating Is Best *for* Hospitals

There can be no noise:

1. Because the system is vented to the atmosphere.
2. Steam and cold water never come in contact.
3. There are no air valves on radiators.
4. No traps or vacuum pumps are needed.

Adsco Graduated Packless Radiator Valve. Full nickel plated. Nickel letters on black dial. Wood handle. Non-rising, two-piece stem. Never leaks—never needs repacking.

NOTE, in the illustration, how an Adsco Valve controls the amount of heat admitted to each radiator. No wasteful overheating.

The Valve and other Adsco Specialties are sold to the trade at uniform prices—not as part of an engineering specification. We furnish engineering service at a moderate fee, without influence on cost of specialties required.

Write for Bulletins Nos. 158-AF and 159-AF covering "Adsco Heating," and Bulletin No. 20-AF, "Community Heating."

AMERICAN DISTRICT STEAM COMPANY

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ADSCO HEATING

AT YOUR SERVICE WHEN YOU BUILD

A World-wide Organization of Laundry Specialists

SPECIALISTS in one phase of hospital organization—the laundry: men who have planned and equipped laundries in many of the world's foremost institutions; men whose business it is to bring efficient economy to the scientific cleansing of hospital garb and linens—

They are at your service when you build. They represent a world-wide service organization—they bring to you the benefits of intensive research, of mature experience and progressive thought.

Whether you plan a small laundry, capable of caring for only a limited amount of work, or an elaborate plant which will satisfy all the laundry needs of a great institution, you will find it to your advantage to accept the cooperation of these specialists.

This cooperation is freely offered; you are cordially invited to use it.

THE AMERICAN LAUNDRY MACHINERY CO.

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Hospital Furniture

Inset Wall Cabinets, Fire Hose Cabinets, Operating Room Furniture


Hospitals Furnished Complete

A Suggestion List, outlining the complete equipment of a Modern Hospital, will be sent upon request

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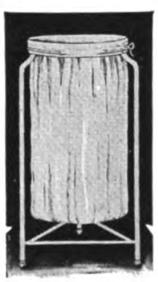


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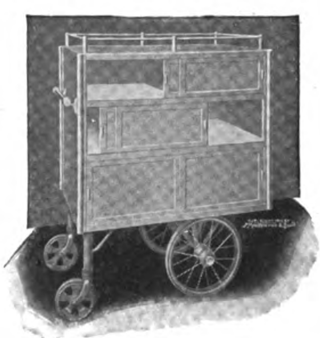
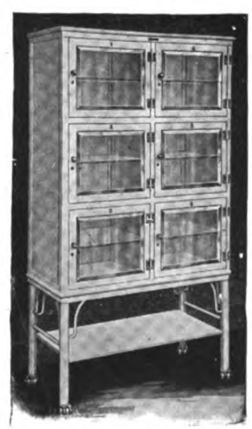
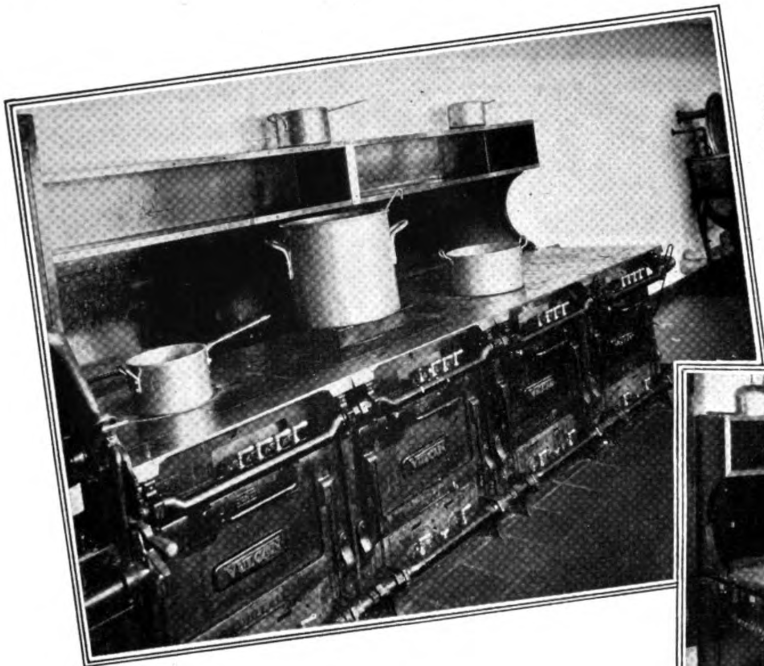






Fifth Avenue
Hospital
New York City

Mt. Sinai
Hospital
New York City

The Kitchens of These Two Great New York City Hospitals Are Equipped With

VULCAN GAS RANGES

The planning of kitchens for Hospitals, Hotels and institutions of many kinds has been for years an important part of the service we have to render architects.

The equipment we supply — gas ranges, broilers, ovens, etc. — is in itself an important contribution to cooking efficiency and economy. But the choosing of the proper units and their arrangement, which requires a special knowledge and talent, is of almost equal importance.

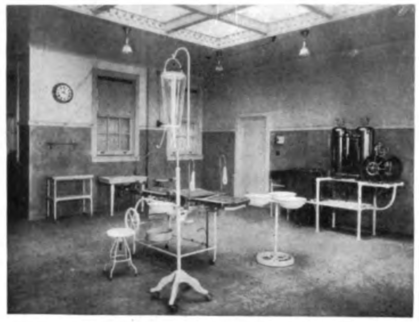
Blue prints of kitchen floor plans and equipment best suited for each cooking need will be furnished without charge upon request.

Write for particulars of the service we offer and folders which fully describe the many superior features of Vulcan Gas Ranges and Kitchen Equipment.

Among the Other Notable Vulcan Equipped Institutions Are:

Lying-In Hospital, Boston, Mass.
Rhode Island Hospital, Providence, R. I.
Bellevue Hospital, New York City
City Hospital, Jersey City, N. J.
Municipal Hospital, Minneapolis, Minn.
Bellevue-Stratford Hotel, Philadelphia
Hotel Marlboro-Blenheim, Atlantic City, N. J.
Hotel Martinique, New York City
McAlpin Hotel, New York City
Bunn Bros. Cafeterias, New York City
Knickerbocker Grill, New York City
Terminal Restaurant (Union Station), Washington, D. C.
New York Athletic Club, New York City
Union League Club, New York City
Westchester Biltmore Country Club, Rye, N.Y.
Princeton University, Princeton, N. J.
Purdue University, Lafayette, Ind.
Smith College, Northampton, Mass.
General Electric Co. (Restaurant), Harrison, N. J.
New York Telephone Co. (Restaurant) New York City
Standard Oil Co. (Restaurant), Bayonne, N.J.

WM. M. CRANE COMPANY 16-20 West 32d St., New York City



End This Million Dollar Evil!

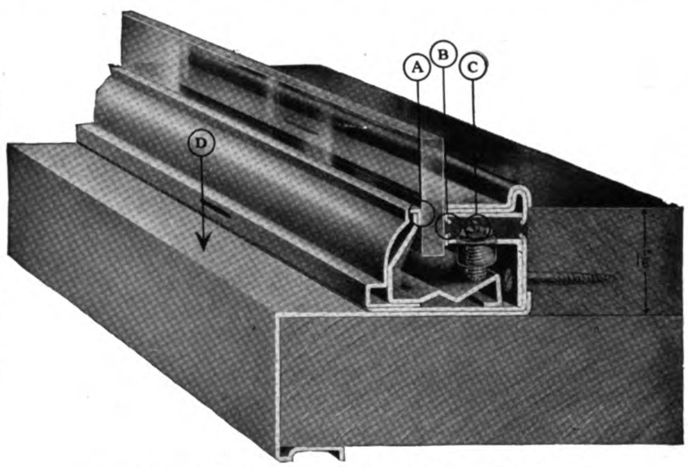
Insurance figures reveal that millions of dollars literally "go to smash" each year through plate glass breakage. And the loss of time and show window space would add many millions more.

Yet this huge national waste is needless and preventable. Faulty setting is the chief cause. Faulty setting is next to impossible when you include in all your store front specifications the following

Glazing Specification

All Metal Sash, Corner Bars, Division Bars and Self-Adjusting Setting Blocks Used in Store Fronts Must Be Listed by the Underwriters' Laboratories

A is the point where the outer member presses against the glass, when the delicate, watchlike turning of the key at C brings the glass automatically into contact with the rabbet of gutter B sliding on the anti-friction Murnane Self-Adjusting Setting Block.



The Sill Covering D extends from the inner side of the rabbet to the lower edge of the face, eliminating joints —perpendicular screws or nails — positively protecting the wood against deterioration, for leakage is impossible.

No. 110 Zouri Combination Key-Set Sash and 705 Sill Covering

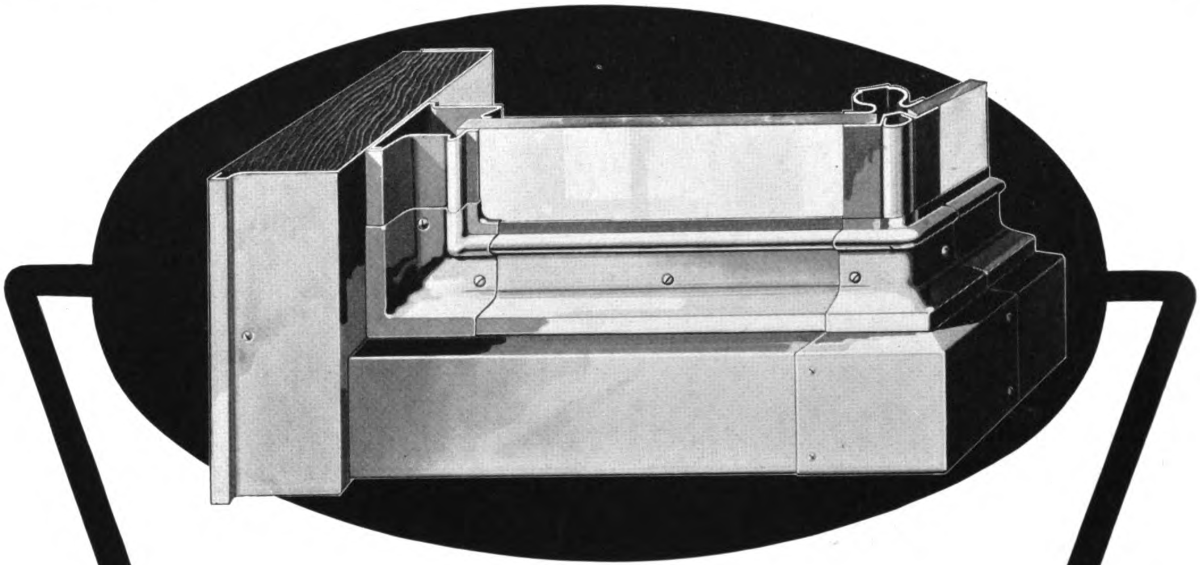
Why tolerate an unnecessary evil when this certain remedy is known? The installation of Zouri Key-Set Construction will prove a boon to insurance companies, manufacturers, merchants and consumers.

All Zouri Key-Set Sash, Corner, Division Bars and Self-Adjusting Blocks have been listed by the Underwriters' Laboratories.

Zouri Drawn Metals Company

Factory and General Offices

1630 EAST END AVENUE - - - CHICAGO HEIGHTS, ILLINOIS



THE NEW No. 40 SASH

AS USED IN

KAWNEER SOLID COPPER STORE FRONTS

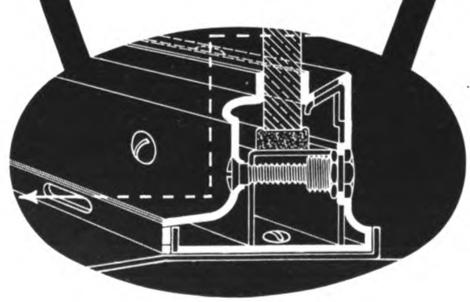
Architects will, we believe, appreciate the many features of this latest addition to Kawneer Store Front Construction. Extra heavy gauge metal gives rugged strength and enables it to be installed with any kind of a sill: marble, stone, tile or concrete. Machine adjustment screws afford accurate control of the grip on the plate glass. Of course Kawneer Resiliency is a basic feature. The trim architectural lines also make this sash very attractive.

As shown in the detail section below, control of ventilation and drainage may be provided for as in other Kawneer sash by a gutter member.

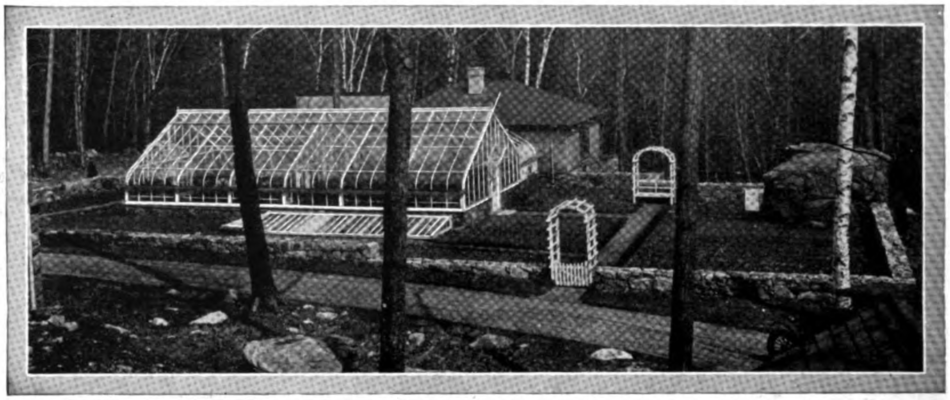
Our new complete Catalog "L" is now ready for distribution. It is designed to give architects the sort of information they should have about Kawneer Store Front construction. We shall be glad to mail samples of this new sash and a copy of our new Catalog "L" to architects.

THE KAWNEER COMPANY
NILES MICHIGAN

We have more than seventy branch offices and sales agencies in the principal cities of the country We shall gladly refer architects to the nearest sales agency for service and any information desired

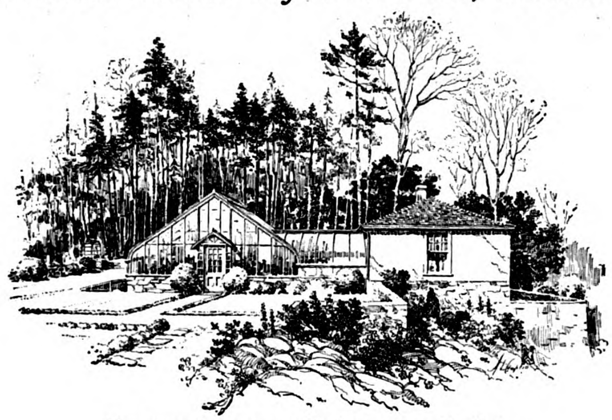


Estimates covering Kawneer store front material will be furnished gladly upon request. Just drop us a line giving details of your specification. Our estimates will be made up and sent to you promptly.

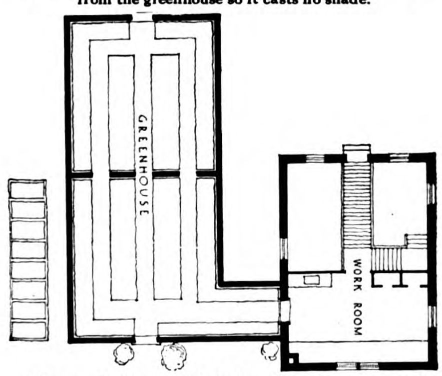


Erected for Dr. J. H. Lancashire

Layout, Manchester-by-the-Sea, Massachusetts



The connecting passage, aside from giving a fine little propagating house, places the work room far enough from the greenhouse so it casts no shade.



The greenhouse proper is 25 feet wide, 50 feet long and divided into two compartments.

Hitchings and Company

Greenhouse and Conservatory Builders

Home Office and Factory, Elizabeth, N. J.

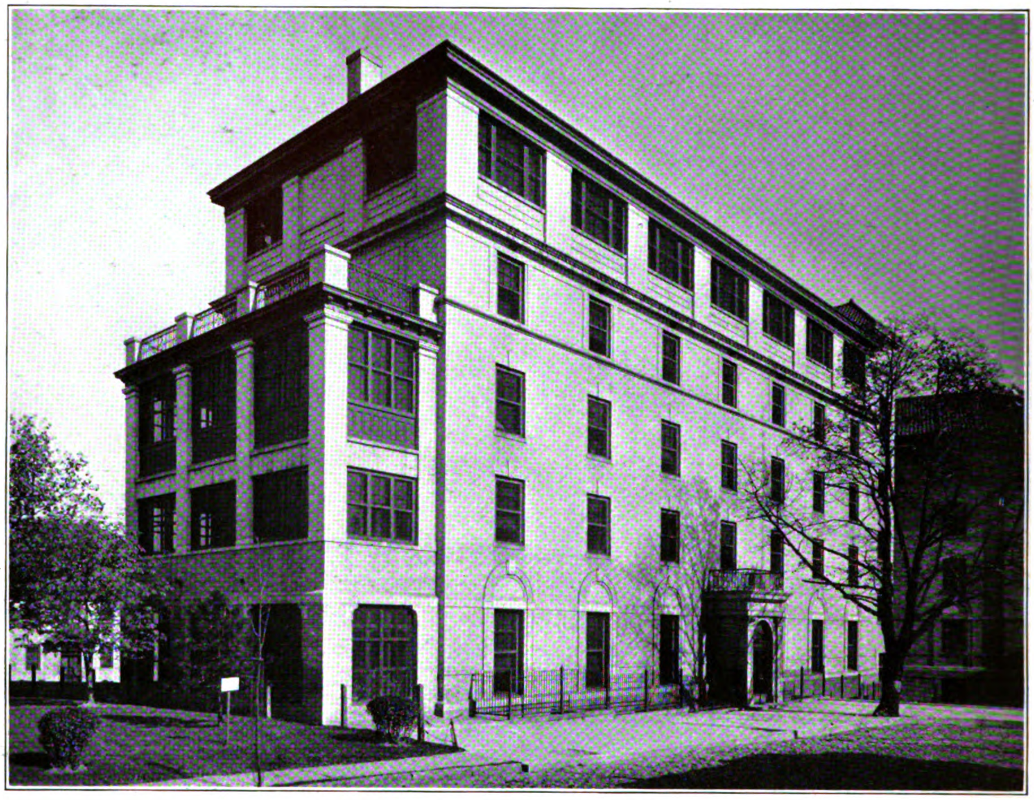
New York	Philadelphia	Boston 9	Rochester
101 Park Avenue	Empire Building	294 Washington Street	Commerce Building

The new Jersey City Hospital, Jersey City, N. J. John T. Rowland, Jr., Jersey City, N. J., Architect

AIR-WAY

Multifold Window Hardware

Floods Hospitals with Sunshine and Fresh Air

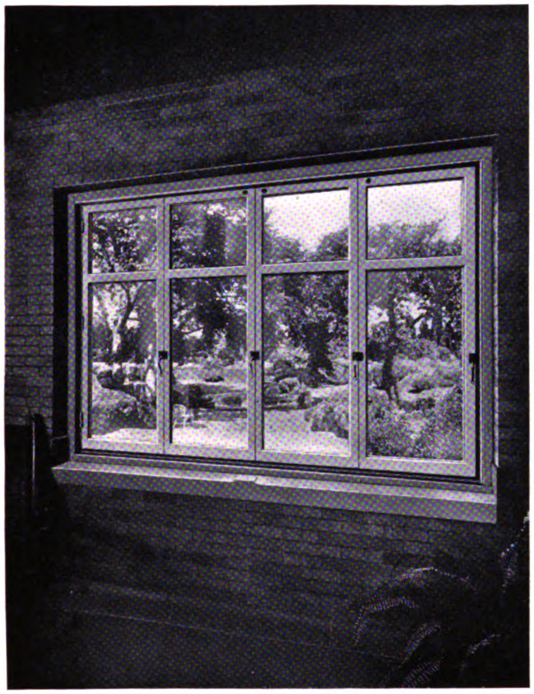


How this and other great hospitals utilize AIR-WAY

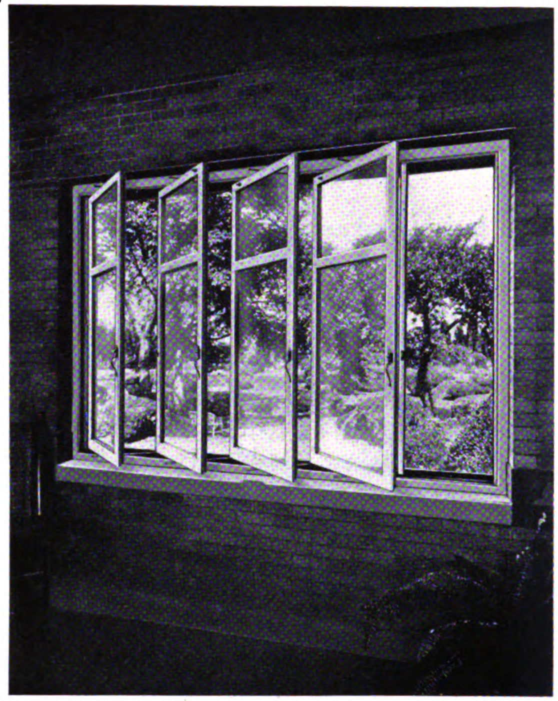
TRADE MARK

Here is a near view of one of the group of buildings comprising the new Jersey City Hospital at Jersey City, N. J. Observe that the windows of the entire top floor, as well as those of the sunrooms on the first three floors, are fitted with AiR-Way Multifold Window Hardware. Among other AiR-Way equipped hospitals are the Jefferson County Tuberculosis Sanitarium, Jefferson, Wis., St. Margaret's Hospital, Spring Valley, Ill., and the Wm. Beaumont General Hospital, erected by the U. S. Government at Fort Bliss, Texas.

RICHARDS-WILCOX R-W AURORA TRADE MARK



Completely closed



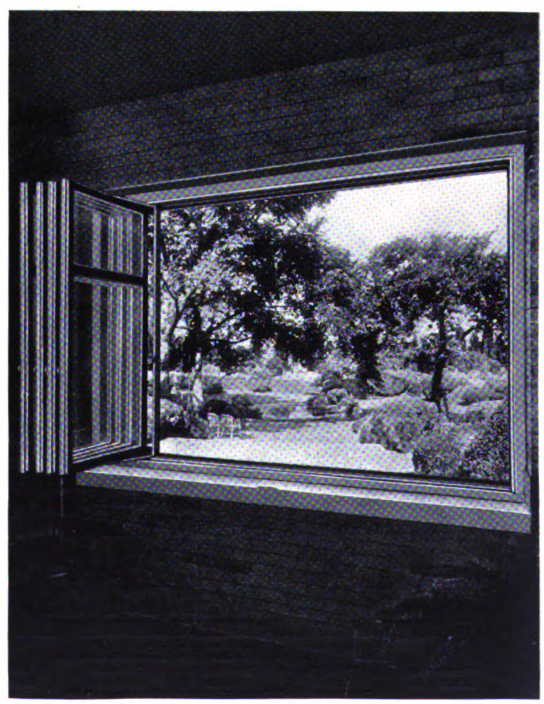
Adjusted for ventilation

These pictures show the advantages of

AIR-WAY TRADE MARK

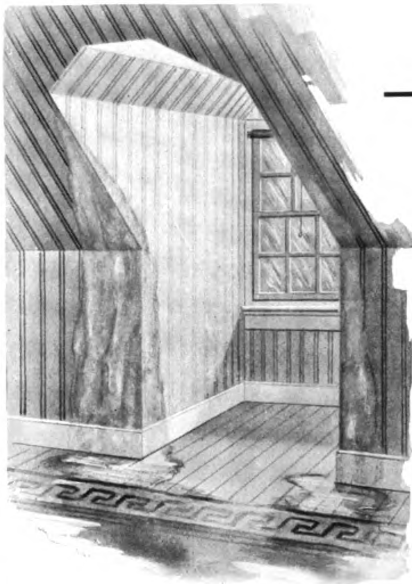
Windows equipped with AiR-Way Multifold Window Hardware fit snugly and exclude all wind and rain. When adjusted for ventilation, they do not permit the wind to blow directly into the room and are absolutely rattle-proof. When completely opened, they afford an unobstructed opening almost the full width of the frame.

AiR-Way equipped windows swing inward without interfering with the screen, which may be applied in the usual manner. If desired, curtains and shades may be attached directly to each sash.



Completely opened

RICHARDS-WILCOX R-W AURORA TRADE MARK



—these leaks are preventable

Every rain storm causes thousands of dollars of damage to walls, floors and furniture in buildings where unsuitable material has been used for valleys, gutters or flashings.

But trouble of this character can be permanently prevented by using the right kind of material for these important places.

A century's experience has proven the value of

TARGET AND ARROW

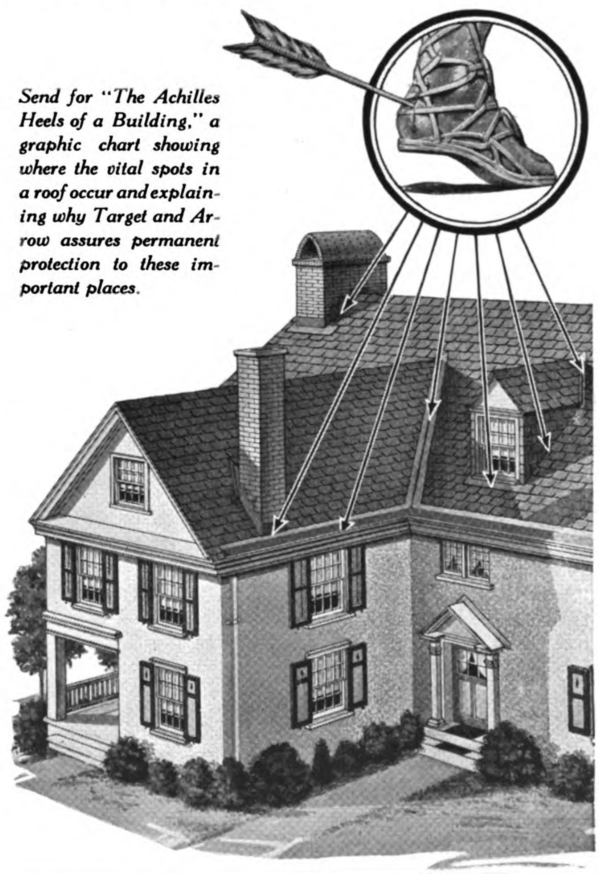
Look for this Trade Mark on every Sheet

ROOFING TIN

(Prior to 1905 called Taylor's "Old Style")

the old reliable hand-made, hand-dipped tin, made by an old Welsh process in which each sheet is *repeatedly soaked and dipped in pots of boiling palm oil and molten metal consuming 35 minutes' time to coat each sheet*, and insuring an amalgamation of the coating with the base plate that cannot be done in any other way.

Records show that Target and Arrow, used for valleys, gutters and flashings, will outlast the roof itself — unless the whole roof is of Target and Arrow. Yet the increase in cost, due to the use of Target and Arrow, only amounts to a very few dollars—an insignificant sum when compared to the total cost of the building.



Send for "The Achilles Heels of a Building," a graphic chart showing where the vital spots in a roof occur and explaining why Target and Arrow assures permanent protection to these important places.

N. & G. Taylor Company

312 Chestnut Street Philadelphia, Pa.

Headquarters for good roofing tin since 1810

Walker & Gillette Architects

Grasslands Hospital East View, New York

Modern Hospitals use Hastings Shayd-Awns to Close Openings on Porches

OLD-FASHIONED awnings and similar protective measures against sun, wind and weather are half-measures. They do not give adequate protection when in use, and they present difficult storage problems when out of use.

HASTINGS Shayd-Awns, as shown in the illustration of the Grasslands Hospital, can be adjusted in any position desired. They roll up and down like window shades. They eliminate the rope-troubles, the pulley-troubles, and every other form of trouble associated with old-fashioned types of awnings.

Locked-in-at-the-sides, HASTINGS Shayd-Awns stay put. They cannot flap, bulge or buckle. Once installed, they are up to stay—a permanent installation, practically invisible when not in use as all parts are finished to match the trim.

SEE OUR CATALOGUE IN SWEET'S

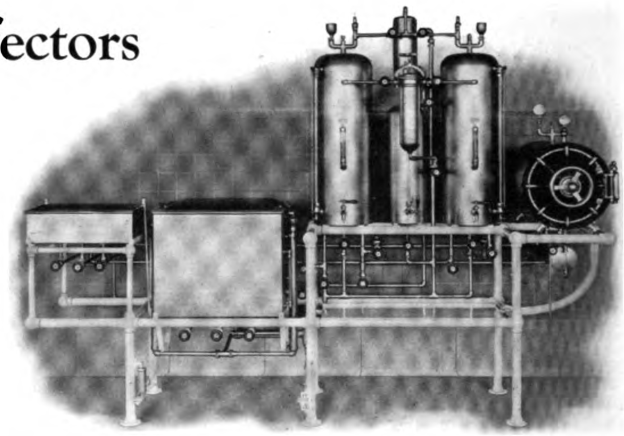
Architects interested in hospitals will be interested in the Hastings Shayd-Awn. Write to us for further information

SEE OUR CATALOGUE IN SWEET'S

We also manufacture the HASTINGS ROLUP Screen. It rolls up like a window shade. It is locked in at the sides. It will not rust or harden and crack from continuous rolling

ROLUP SCREEN COMPANY—410 East 32nd Street, New York

Sterilizers : Disinfectors
(Exclusively)



Battery of Sterilizers installed in Orange Memorial Hospital, Orange, N. J.
Crow, Lewis & Wick, Architects, New York

A quarter of a century in the specialization and manufacturing of sterilizers and disinfectors, successful installation in hundreds of the best hospitals, and unequaled factory facilities for manufacture and prompt delivery back your choice of our equipment.

Our engineering department co-operates with architects. Our service provides data complete in every detail. Your inquiry will have a satisfactory reply.

AMERICAN STERILIZER COMPANY - ERIE, PA.

New York Office: 200 Fifth Avenue, New York City

Fence for the School,
Playground and Athletic Field

Fence that will be so completely satisfactory that, like others for whom we have done school and playground work, you will be dropping in to say how fine the newly Afco-enclosed grounds are and that it is Afco Fence first, last and all the time for you.

Common sense fence

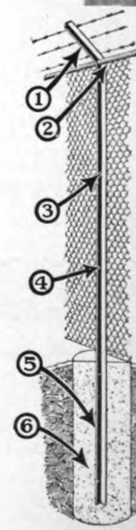
Afco School Yard, Playground and Athletic Field Fences, like Afco Industrial Fence, are sturdy steel fences of notably common sense build.

The Afco School Yard Fence shown above is made of extra height and with straight top rails.

Admission only through the gate

Afco Fence for the Athletic Field and Playground is built with the non-breakable Afco integral overhanging arm carrying barbed wire, as shown to the right. It is non-climbable. No one comes in over the fence; everybody enters through the admission gate.

Each circle a special Afco Fence feature.



Our District Representative near you will gladly call. Or send for descriptive literature

American Fence Construction Co., 130 West 34th St., New York

21 Round Trips for one cent

THIS G&G Electric Hoist proved its real operating economy by raising and lowering 108 ash cans in one 5-cent Kilowatt hour, or at the rate of 21 round trips for one cent's worth of current. These figures are the result of one of a series of tests made for us by Sprague Electric Works of General Electric Co. to substantiate our claim that G&G Electric Hoists consume surprisingly little current.

The above Hoist is installed at the Hotel Grand, New York City, and is the same Hoist that, after three years' service, raised 3,500 cans of ashes (an accumulation during a heavy snowstorm) in one continuous operation, without the slightest mechanical failure. Height of lift is 21 ft. 10 in. (Where distance of lift is greater or less, current consumption would vary.)

G&G Hoists are made in various models, electrically and manually operated, to meet all hoisting problems where loads are under 1,000 lbs.

For Scale Drawings and Specifications see Sweet's pages 2007-2015, or G&G October, 1921 Catalog

GILLIS & GEOGHEGAN
544 West Broadway - New York

The G&G ELECTRIC Telescopic Hoist
REG.U.S.PAT.OFF.

"Giant Metal," "Red Metal" and Steel

SASH CHAINS

Utica Masonic Memorial Hospital, Utica, N. Y.
H. P. Knowles, Architect, New York

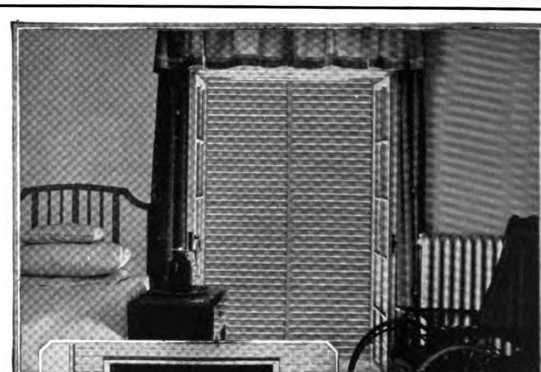
Ventilation is an important factor in any building. By the use of 6,000 ft. of No. 1 "Giant Metal" Sash Chain for hanging the windows in the Masonic Memorial Hospital, the best of ventilation is assured, as the windows can be raised or lowered with the minimum of trouble and effort.

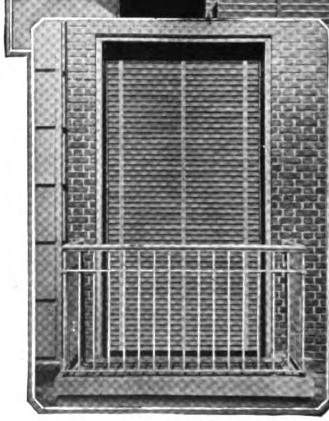
See illustrations and description of this hospital in preceding pages of this issue.

SEND FOR SASH CHAIN BOOKLET

See page 1191, Sweet's Catalog

The Smith & Egge Mfg. Co.
BRIDGEPORT, CONN.
ORIGINATORS OF SASH CHAINS





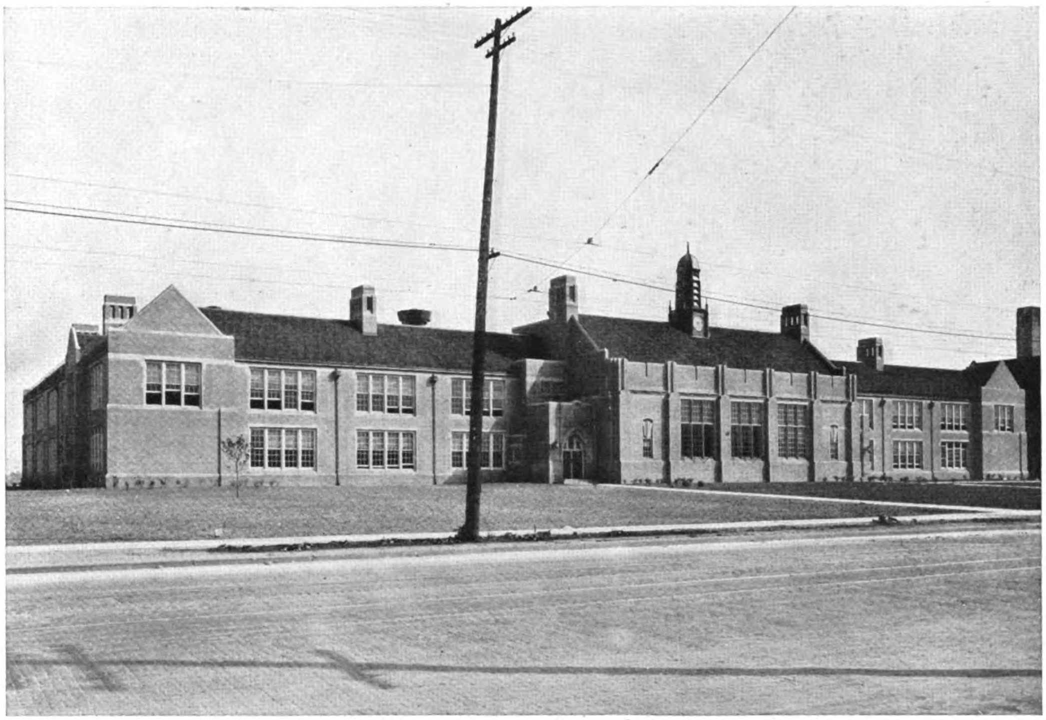
New Pavilion
Mt. Sinai Hospital, N.Y.
equipped with

WILSON BLINDS

They control the light and air, and contribute largely to the patients' rest and comfort.

Catalog and prices forwarded on request

THE J. G. WILSON CORPORATION
1 East 36th St., New York — Offices in Principal Cities



Southwestern High School, Fort Street, Detroit, Michigan. Architects, Malcomson, Higginbotham and Palmer, Detroit.

FIFTY grade schools and nine high schools in Detroit are Carey roofed. Certainly this newest high school would not have a Carey roof if the fifty-eight others were not giving satisfaction.

They will give you the satisfaction they are giving Detroit.

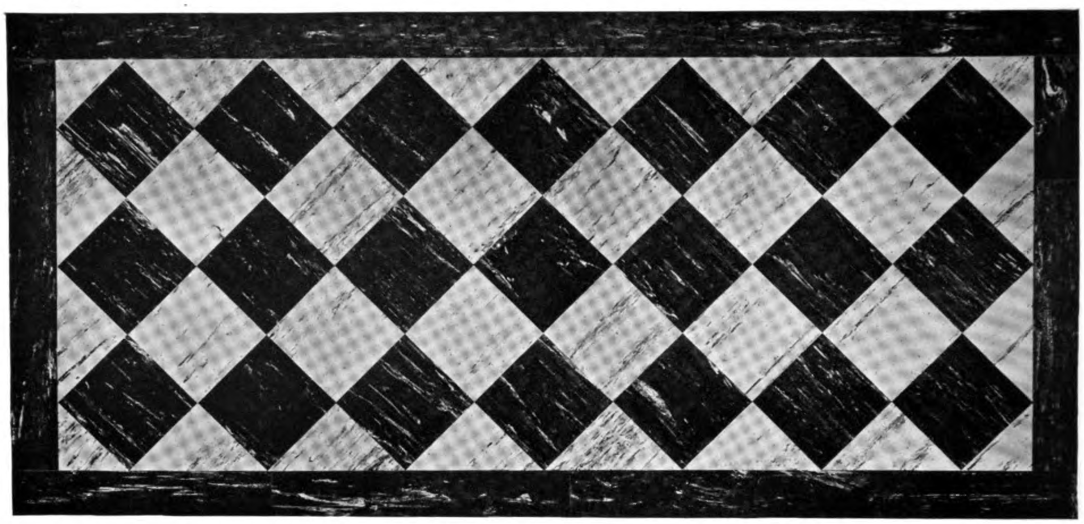
There are Carey Asbestos and Asphalt built-up specifications for flat and irregular surfaces and Asfaltslate Shingles for exposed steep surfaces.

Write for Carey Architects Specification Book.

THE PHILIP CAREY COMPANY
504-524 Wayne Ave., Lockland, Cincinnati, Ohio
Branches and Distributors in Sixty Leading Cities

Carey
REG. U.S. PAT. OFF.
BUILT-UP ROOFS

18-A



A VEINED AND MOTTLED RUBBER TILE WITH THE APPEARANCE OF MARBLE

DIAMOND SEAL RUBBER TILE

BEAUTIFUL - RESILIENT - INDESTRUCTIBLE

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No matter what grade of bedding you require, your ultimate satisfaction depends upon the integrity of the maker in delivering exactly according to specifications.

The integrity of this firm is established through more than half a century of service in supplying quality bedding for America's foremost hotels and clubs.

You may obtain bedding from us of luxurious comfort, for one bed or a thousand, made to your order with an assurance of utmost quality!

Ask for illustrations, price list and particulars

Charles P. Rogers & Co., Inc.
Established 1855
16 East 33rd Street, New York

PUMPS

Industrial—Agricultural—Municipal—Residential

A type for every service

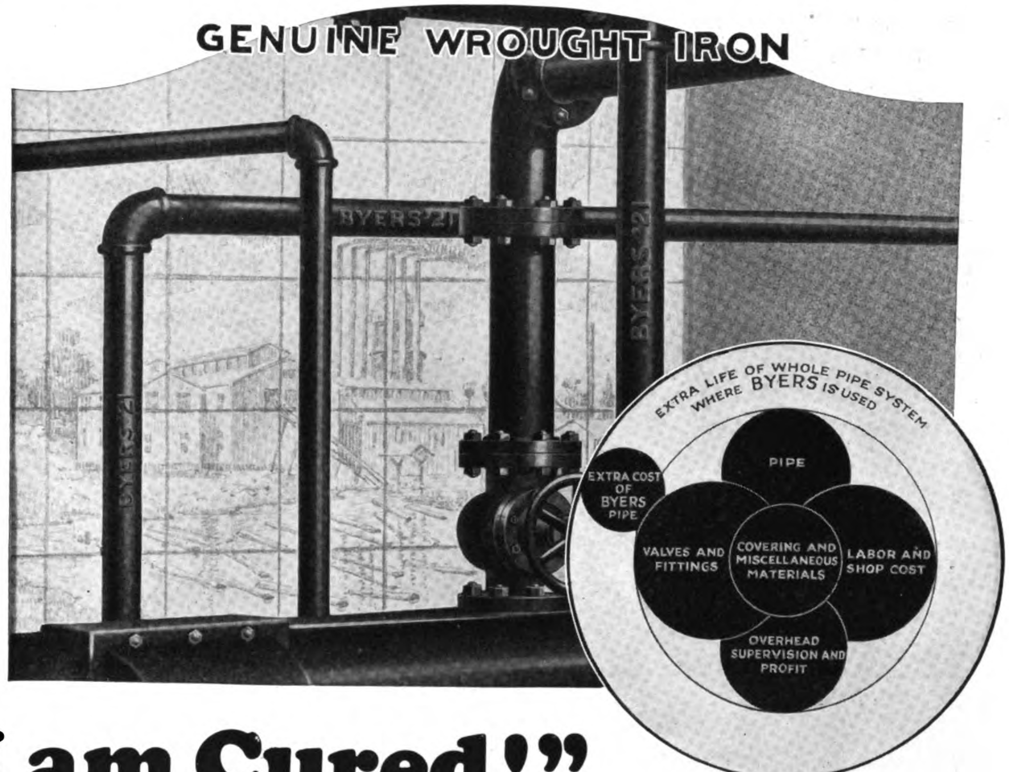
Bulletins on request

THE GOULDS MANUFACTURING CO.
SENECA FALLS, N. Y.

GOULDS

BYERS PIPE

GENUINE WROUGHT IRON



"I am Cured!"

said an architect to a Byers salesman. "I never attached much importance to the subject until a pipe, buried in my living room ceiling, burst and did $3,000.00 worth of damage to floors, walls, draperies, rugs and furniture. From what I have since found out about pipe, I have decided to allow no clients of mine to be quite as foolish as I was myself. From now on I will specify Byers pipe for all permanent buildings."

Even leaving out of consideration this possible damage to the building and furnishings, the cost of pipe failures is ten or twenty times greater than the bare cost of pipe itself. And the extra cost of Byers rust resisting pipe measured against the installation cost is only 5 to 10%. (See Diagram). And this small amount is the means of greatly increasing the life of the installation, reducing maintenance cost, and preventing serious damage to the building and its contents.

Send for Byers Bulletin No. 38 "The Installation Cost of Pipe"

A. M. Byers Company • Pittsburgh • Pa.

Established 1864

New York Philadelphia Boston Chicago Cleveland Houston Tulsa Los Angeles

Look for the Name and Year rolled in every length

CYPRESS "The Wood Eternal"

is one of the best of exterior trim woods. Many careful judges think it the very best of all woods for outdoor use. Its extraordinary resistance to all rot influences makes a strong appeal to the thrifty mind. Its popularity with the public is based on a growing knowledge of its worth.

Let our **"Architects' Helps Department"** help YOU. Our entire resources are at your service with Reliable Counsel. We invite Correspondence with a serious purpose in it. Write to-day for Vol. I of the Cypress Pocket Library with complete U. S. Government report and full list of **Free Plans.**

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Insist on Trade-Marked Cypress at your local dealer's. If he hasn't it, *let us know*

BAYSHAN

The Absolute

WATER PROOF FLOOR

A Hospital Floor Which
Will Withstand Fire, Water,
Storm and Wear
and yet be
Quiet, Resilient and Sanitary

We have installed floors in many institutions varying widely in character

Here are a few of them:

U. S. P. H. S. HOSPITAL, FORT BAYARD, N. M.
WALTER REED HOSPITAL, WASHINGTON, D.C.
MT. SINAI HOSPITAL, PHILADELPHIA, PA.
WOMEN'S HOSPITAL, NEW YORK CITY
MEMORIAL HOSPITAL, ELYRIA, OHIO

Installed in old and new buildings over wood or concrete base

Special Service Flooring Corporation

Grand Central Terminal **New York City**

Typical Magnestone Installation

A Vastly Better Flooring

MAGNESTONE makes the most satisfactory flooring for hospitals, schools, stores and industrial buildings. Also for use in kitchens, dining rooms, corridors, bathrooms and offices. It makes an attractive floor that is light in weight, yet of great tensile strength. Years of service with no up-keep. The most sanitary floor, because non-porous and seamless—no place for dirt and germs to collect. Waterproof, fireproof, warm and non-slippery. May be laid plain or with borders with cove base and wainscoting in any color or combination of colors. Eleven colors to choose from.

Magnestone Service Insures Satisfaction

We maintain crews of expert flooring mechanics and make complete installation in every part of the United States and Canada. Magnestone floors are fully guaranteed. Our reputation for complete service and co-operation means satisfaction.

Write for Samples and Descriptive Booklet

Architects and Builders should write for our free booklet on Magnestone Flooring and sample of the flooring as laid. When you investigate Magnestone you will be sure to specify it—to your credit as an architect. Write us today. There is no obligation involved.

AMERICAN MAGNESTONE CORPORATION
Springfield, Illinois
Division of Floors
Installations made throughout United States and Canada

MAGNESTONE FLOORING COMPOSITION

Archt's Werner & Adkins, Cincinnati, used 24-inch "CREO-DIPT" Stained Shingles finished "Dixie White" for wide shingle effect on side walls; 16-inch "CREO-DIPT" Stained Shingles—Greenish Gray—on roof. One of many "CREO-DIPT" Homes in Cincinnati by these Architects.

REAL economy in building materials is realized in "CREO-DIPT" Stained Shingles for side walls as well as roofs because the price is always low compared to other materials.

"CREO-DIPT" Stained Shingles have won the approval of prominent architects and builders because of their quality as well as their fast colors. The open market does not afford such quality in either shingles or stain.

Pure earth pigments ground in pure linseed oil are driven into the fibres of the wood with creosote. They save muss of staining-on-the-job, painting and repair bills. You secure color effects not possible with other materials.

Send for Portfolio of fifty large photographs of homes of all sizes by prominent Architects. Ask about our special "CREO-DIPT" Stained Shingles for Thatched Roof effect; also the large 24-inch "CREO-DIPT" Stained Shingles for the wide shingle effect on side walls, either in Dixie White for the true Colonial white effect, or shades of green, brown, red or gray.

CREO-DIPT COMPANY, Inc.

1025 Oliver Street, North Tonawanda, N. Y.

Sales Offices in Principal Cities. Many Lumber Dealers Carry Standard Colors in Stock. Plant at Minnesota Transfer, St. Paul, for Western Distributors

Portfolio of Homes

"CREO-DIPT" *Stained Shingles*

MARBLELOID

The Modern Flooring for Hospitals

FRANK H. VILLIE
ASSOC. M. AM. SOC. C. E.
ENGINEER AND CONTRACTOR
E. P. WILBUR TRUST CO. BUILDING
BROADWAY AND FOURTH ST.
BETHLEHEM, PA.

The Marbleloid Company,
Broadway and 34th.St.,
New York,N.Y.

January 12,1921

Gentlemen:-

In reply to your letter of January 10th. concerning installation of Marbleloid at St.Luke's Hospital beg to advise as follows.

The Men's,Women's,Bethlehem Steel,Liberty, and Isolation Wards have Marbleloid floors installed by your Company and we have found the floor to be most satisfactory in every way and am glad to recommend your product to anyone interested in a good sanitary floor which wears well and is easy for the Nurses to walk over.

We are building an addition to the Hospital and as you know we specified Marbleloid Floors for this work and expect to specify the same in the future as we have not found a more satifactory floor.

Yours very truly,
Frank H. Villie

Marbleloid Flooring is used throughout the Nurses' Home of St. Agnes Hospital, Philadelphia, which is illustrated and described on page 307 in this issue of "Architectural Forum."

QUALITIES of Marbleloid Flooring which appeal to hospital architects are: **Sanitary**— it could not be more so for there is not a crevice or corner in the entire floor where germs or dust could hide. **Fireproof, Warm, Quiet. Offers an easy and certain foothold. Always attractive. Quickly cleaned.** Manufactured, installed and guaranteed by one organization.

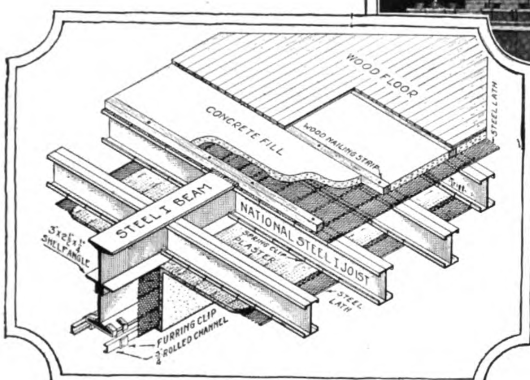
Perhaps the most logical reason why Marbleloid Flooring should be used in hospitals is that after its installation flooring worries and expenses are ended. This flooring will not chip or dust, require painting or varnishing, resurfacing or any other kind of alteration or expensive upkeep. The floor is as permanent as the building, and the color is as permanent as the floor. It is easy to see that the first cost is the last cost, therefore it is bound to be an economical flooring.

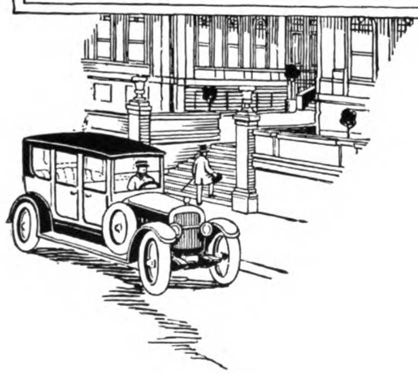
Get All This Information.—On request we will mail samples of Marbleloid Flooring, Specification, List of Hospital Users and illustrated folder describing characteristics of this flooring and its application to old and new hospital buildings.

THE MARBLELOID COMPANY, **1404 Printing Crafts Building, New York**

Methodist Episcopal Hospital, St. Joseph Missouri

Eckel & Aldrich Architects





National Steel Joists In Hospital Construction

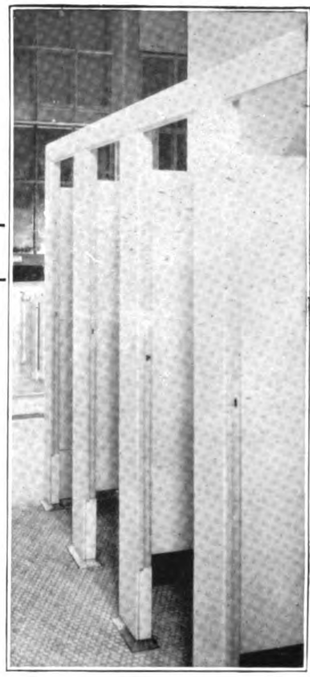
THAT usually large item of cost in the construction of any hospital—firesafe floors—can be very materially reduced when National Steel Joists are used.

Compared with other types of recognized firesafe floor construction, National Steel Joist floors eliminate over 50% of the dead weight. This means half the amount of material to buy, ship, handle and erect.

We have a cloth-bound handbook giving many tables, detail drawings and engineering data of value to any architect. We will gladly mail a copy upon request.

THE CENTRAL STEEL COMPANY
Massillon, Ohio

NATIONAL STEEL JOISTS



Non-porous — Non-absorbent
Stain-proof

VITROLITE

"Better Than Marble"

for

Wainscoting
Wall Surfacing
Toilet Partitions

in

Homes and Public Buildings of all descriptions

These three characteristics of Vitrolite are in themselves the strongest possible recommendations for its use in hospitals.

Here is a slab material that is by its very nature the utmost in sanitation. Its fire polished surface is harder than flint and will not scratch or score. Always looks clean and new. Acids and alkalies do not affect it. A damp cloth instantly removes spots or smears. Reduces cleaning costs. Also ideal for operating rooms, laboratories, bathrooms, table and counter tops, diet kitchens, shelving, etc. Furnished white, black or decorated.

A list of prominent hospital installations on request. For complete particulars or information, write

THE VITROLITE COMPANY

Chamber of Commerce Building, Chicago

Service Organizations in Principal Cities of America and Overseas

INDIANA LIMESTONE

Booklets sent free on request

Bloomington Hospital,
Bloomington, Ind.
Alfred Grindle,
Architect

Fifth Avenue Hospital,
New York City
York & Sawyer
Architects

Lower stories of
Indiana Limestone

Henry Ford Hospital, Detroit, Mich. *Albert Wood, Architect*

INDIANA
THE NATION'S

FISH SERVICE

—Always Dependable

Sales Service

ALONG with Fish Brick goes Fish Brick Service — this means a sufficient quantity of your first choice delivered "on the job" on time—no need to fall back on an alternate choice.

Hospitals require immense quantities of face brick, since all facades are usually exposed. The choice of Fish Face Brick means the right brick and no delays.

Detail of Entrance, Nurses' Home
Architect: John Oakman
Contractor: James C. McGuire

Fish Brick Sales Company, Inc.

25 West 45th Street, New York

An Announcement

The Modern Hospital Publishing Co., Inc., announces a competition for plans of a

Small Community Hospital

in order to stimulate a greater interest in the construction of economically arranged and architecturally artistic hospitals, and in order to provide boards of trustees of small institutions with a group of suggestive plans that will make for more efficient care and treatment of the sick.

$1,000 in Prizes

will be given to architects through the competition, the general program of which was announced at the twenty-fourth annual conference of the American Hospital Association at Atlantic City, September 25-28.

A copy of the general program of the competition will be gladly furnished any interested architect.

Final date for registration, December 15, 1922.
Final date for submitting designs, February 1, 1923.

The
Modern Hospital Publishing Company, Inc.
22 E. Ontario Street
Chicago, Ill.

BRASS PIPE

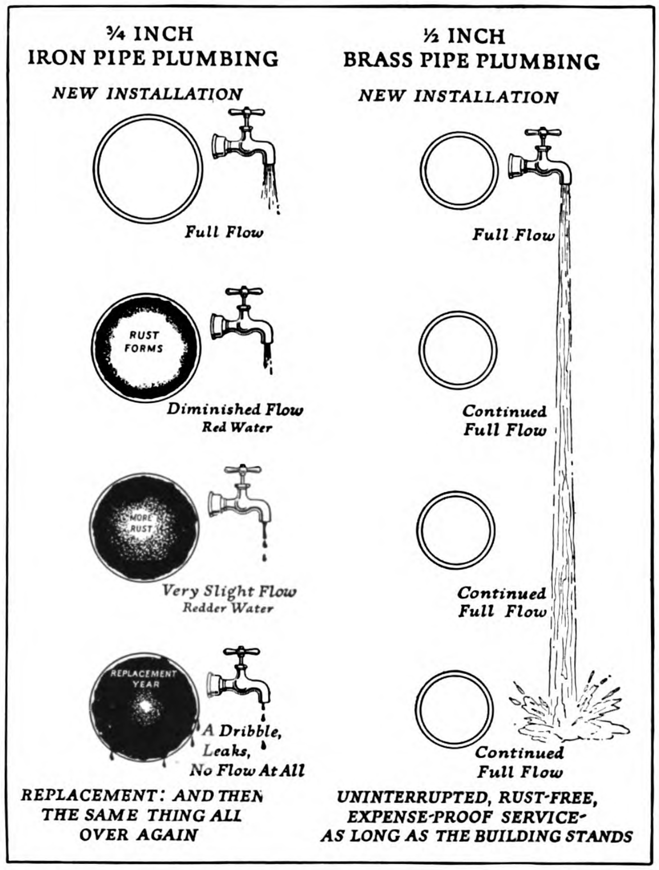
at Almost the First Cost of Iron

WRITING in the Plumbers Trade Journal, Mr. T. N. Thomson, sanitary engineer, compares the sizes of iron and Brass pipe required to carry the same volume of water and presents a table of sizes which, when filled in with prices by the estimator, gives a Brass installation at a cost so little in excess of iron that the difference may be ignored.

To illustrate at a glance the basis for Mr. Thomson's calculations we have prepared the diagram which appears on this page.

Deterioration of iron pipe begins the day it is made and progresses in service until the iron pipe becomes completely clogged with rust.

This corrosion, which is particularly acute in the hot water supply lines, not only discolors the water but greatly reduces or stops delivery at the fixture, and also eats away the pipe wall to such an extent that in many instances leaks



appear within six years and force a renewal of the piping.

On the other hand, Brass pipe delivers at the end of any number of years of service as much water as it does on the day it comes from the mill.

Saving in Pipe Size by Use of Brass

From many years' experience on a variety of work, it would appear that reasonable differences in diameter for street service and cold water lines are as follows:

½	inch Brass instead of	¾	inch iron
¾	" " "	1	" "
1	" " "	1¼	" "
1¼	" " "	1½	" "
1½	" " "	2	" "
2	" " "	2½	" "

For hot water lines, the following appear reasonable:

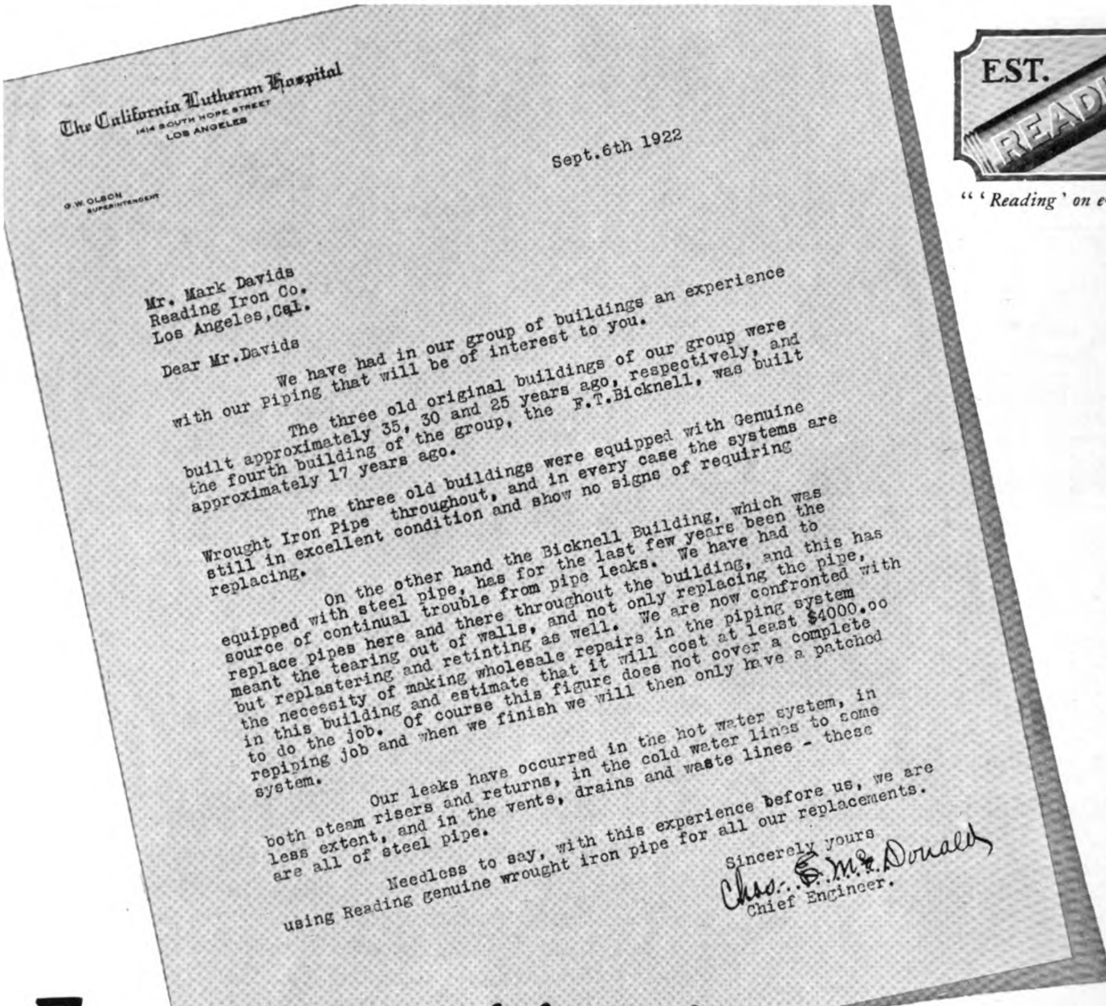
½	inch Brass instead of	1	inch iron
¾	" " "	1¼	" "
1	" " "	1½	" "
1¼	" " "	2	" "
1½	" " "	2½	" "
2	" " "	3	" "

Reprints of Mr. Thomson's article are available upon request to the Association.

"Copper and Brass are cheaper because you pay for them only ONCE"

COPPER & BRASS RESEARCH ASSOCIATION

25 Broadway - New York



The California Lutheran Hospital
1414 South Hope Street
Los Angeles

G. W. Olson
Superintendent

Sept. 6th 1922

Mr. Mark Davids
Reading Iron Co.
Los Angeles, Cal.

Dear Mr. Davids

We have had in our group of buildings an experience with our Piping that will be of interest to you.

The three old original buildings of our group were built approximately 35, 30 and 25 years ago, respectively, and the fourth building of the group, the F. T. Bicknell, was built approximately 17 years ago.

The three old buildings were equipped with Genuine Wrought Iron Pipe throughout, and in every case the systems are still in excellent condition and show no signs of requiring replacing.

On the other hand the Bicknell Building, which was equipped with steel pipe, has for the last few years been the source of continual trouble from pipe leaks. We have had to replace pipes here and there throughout the building, and this has meant the tearing out of walls, and not only replacing the pipe, but replastering and retinting as well. We are now confronted with the necessity of making wholesale repairs in the piping system in this building and estimate that it will cost at least $4000.00 to do the job. Of course this figure does not cover a complete repiping job and when we finish we will then only have a patched system.

Our leaks have occurred in the hot water system, in both steam risers and returns, in the cold water lines to some less extent, and in the vents, drains and waste lines - these are all of steel pipe.

Needless to say, with this experience before us, we are using Reading genuine wrought iron pipe for all our replacements.

Sincerely yours
Chas. E. McDonald
Chief Engineer.

EST. READING 1848

"'Reading' on every length"

Experience like this is worth thousands of dollars!

IT has cost the owners of this hospital $4000 to find out that *it pays to use Reading Genuine Wrought Iron Pipe.* It is the result of such experience, *with both makes of pipe working under similar conditions,* that the true value of Reading can be realized. It is a testimonial that is a warning and a guide to owners and architects to see that corrosive-resisting pipe is specified.

Data for your files will be gladly sent

READING IRON COMPANY, Reading, Pa.

Boston Cincinnati New York Chicago Philadelphia Fort Worth Baltimore Los Angeles Pittsburgh

World's Largest Makers of Genuine Wrought Iron Pipe

READING
GUARANTEED GENUINE
WROUGHT IRON PIPE

Specifications for Genuine Wrought Iron Pipe

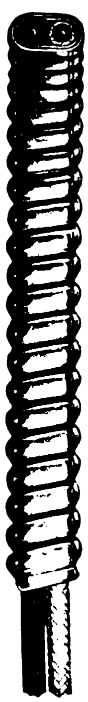
ALL black and galvanized pipe and nipples shall be Reading or equally approved genuine wrought iron standard full-weight pipe, made entirely from puddled pig iron, without the admixture of any scrap except crop ends from the pipe itself.

All sizes of pipe should have the manufacturer's name rolled in the metal in raised or depressed letters one or more times on every full length, and certificate as to quality and weight shall be delivered to the architect by the contractor.

Announcing

OVALFLEX

The new flat armored cable



THE National Metal Molding Company, pioneers in the manufacture of electrical conduits and fittings, are prepared to supply a flat armored cable which gives greater freedom in the location of outlets.

From its shape and extreme flexibility the new product has been named OVALFLEX.

OVALFLEX can be laid on brick or tile walls—without chipping or grooving—and covered by the usual thickness of plaster.

By the use of OVALFLEX, outlets can be located on solid walls as well as hollow partitions. Thus electricity may be carried where needed without the previous handicaps in extension wiring.

OVALFLEX makes possible exposed installations that are much more sightly than can be made with round armored cable.

In addition to these and many other exclusive features of OVALFLEX it can be used for any purpose for which round armored cable is suitable.

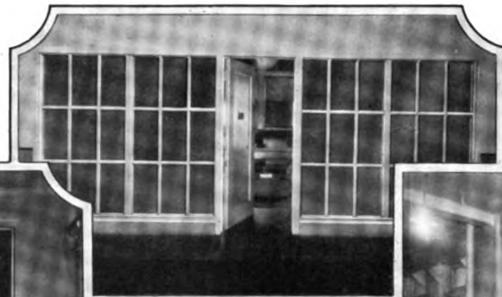
Send for Sample

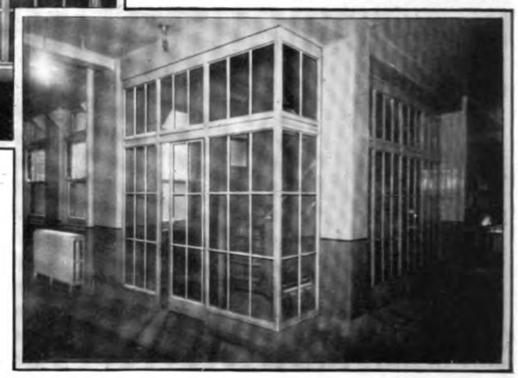
A sample of OVALFLEX, together with further information, will be sent on request to Architects and Engineers or Electrical Contractors whom they may designate

National Metal Molding Co.

1221 Fulton Building
Pittsburgh, Pa.
Representatives in all principal cities

OVALFLEX was developed and is produced solely by the makers of National Metal Molding, Sherarduct and Economy Conduit, Flextube, Flexsteel, National Brackets, Liberty Rubber Covered Wire and Cable, Outlet Boxes and Fittings





Art Metal doors sash and trim after twelve years' use in the Barnard Skin and Cancer Hospital, St. Louis.
Mauran & Russell, Architects

Sanitary, Fire-Resisting, Hollow Metal Doors and Trim for Hospitals

TWELVE years ago Art Metal installed in the Barnard Skin and Cancer Hospital, St. Louis, Mo., a complete equipment of steel doors, sash and trim. The installation consisted of more than one hundred steel doors and trim in addition to the necessary partitions, enclosures and equipment such as electric panel boxes.

Today this equipment is a practical demonstration of what the architect and hospital official may expect in satisfaction and service when Art Metal hollow metal doors and equipment are specified.

The sanitary, baked-on white enamel finish completes the scrupulous cleanliness of the hospital just as the material—steel—completes the fire-resistiveness of the building.

Art Metal offers a complete service in the design and production of architectural hollow metal for all building interiors. Let us supply details and estimates on your next project.

Art Metal

JAMESTOWN, NEW YORK

STEEL AND BRONZE INTERIOR EQUIPMENT FOR BANKS, LIBRARIES, HOSPITALS, SCHOOLS, OFFICE BUILDINGS AND PUBLIC BUILDINGS

BRANCH OFFICES IN ALL PRINCIPAL CITIES

World's largest maker of steel and bronze interior equipment

After the Hospital Is Built "NATIONAL" Pipe Is Rarely Mentioned

Fifth Avenue (General) Hospital, New York City, described in detail in this issue.
York & Sawyer Architects
Meyer, Strong & Jones Con. Engrs.

—*but it is highly important to mention it now!*

ONCE a hospital, or for that matter any building, is completed, the piping system should be forgotten. And stay forgotten for years to come.

The owners and operating heads of thousands of important buildings throughout the country are seldom reminded that their buildings are piped with "NATIONAL." The architects' original specifications disposed of their piping problems.

No matter where you go, no matter what building type claims your interest, the records of "NATIONAL" pipe in service are as numerous as they are convincing.

A bulletin of special interest to Architects and Hospital officials is available without charge

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

District Sales Offices in the Large Cities

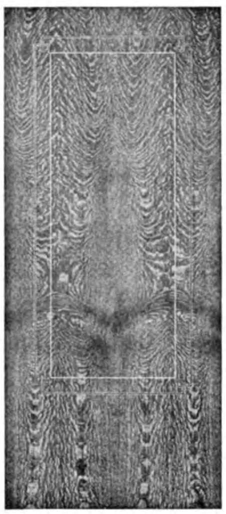
Specialists

(WITH ALL THAT THE WORD IMPLIES)

VENEERED DOORS

FOR

HOSPITALS



A Few Notable Installations

Royal Free Hospital	**London, Eng.**
Liverpool Royal Infirmary	**Liverpool, Eng.**
Fifth Ave. Hospital	**New York**
Mt. Sinai Hospital	**New York**
St. Luke's Hospital	**Chicago**
Presbyterian Hospital	**Chicago**
Children's Hospital	**Philadelphia**
Massachusetts General Hospital	**Boston**
Boston City Hospital	**Boston**
Buffalo City Hospital	**Buffalo**
Toronto General Hospital	**Toronto, Can.**
Spokane Hospital	**Spokane**
St. Vincent's Hospital	**Indianapolis**
Rhode Island State Hospital	**Providence**
State Hospital	**Worcester, Mass.**

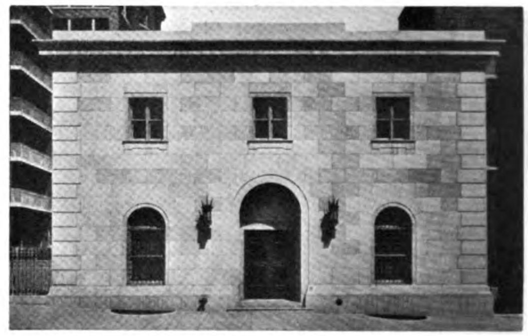
and other prominent hospitals throughout the United States, Canada and England

The Compound and Pyrono Door Co.

Factory and General Offices
St. Joseph - Michigan

See our Catalogue in SWEET'S

RELIANCE FIREPROOF PRODUCTS



Auditorium, Mt. Sinai Hospital, New York
Arnold W. Brunner, *Architect* Dr. S. S. Goldwater, *Consultant*

The modern hospital building must give every assurance of sanitation and low maintenance cost. The Mt. Sinai Hospital in its recent buildings has set a standard for hospital design and construction that can be followed with profit by all hospitals. It is significant that in the Administration Building, the Auditorium and the Pathological Building

Reliance Fireproof Products

have been extensively used.

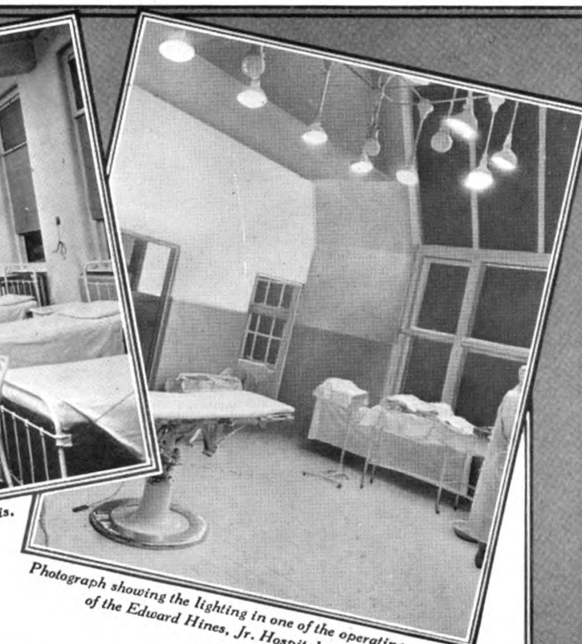
Reliance doors, windows, partitions and trim are absolutely fireproof. Their attractiveness and permanence add that touch of refinement and character always sought for by those architects who seek to combine beauty with utility.

May we furnish estimates covering the work you now have in hand?

Reliance Fireproof Door Co.

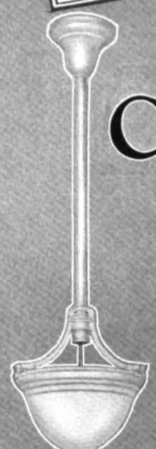
47 Milton St.
Brooklyn, N. Y.

Ward, City Hospital, Indianapolis, lighted with X-Ray Eye Comfort Lighting



Photograph showing the lighting in one of the operating rooms of the Edward Hines, Jr. Hospital, Chicago

Comfortable Lighting



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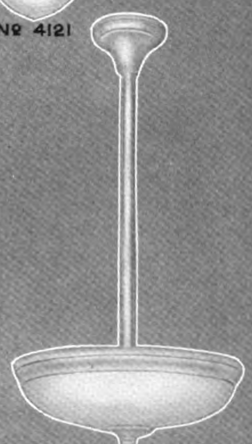

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For Wards

Comfort is the one service which every hospital must render. Without it, it does not fulfill its purpose. Glaring light irritates the patients and retards recovery. X-Ray Eye Comfort Lighting gives a pleasant, glareless, well diffused light, which adds greatly to the comfort of the patient.

For Operating Rooms

To the Surgeon in the operating room intense, well diffused lighting without shadows is absolutely essential. Our Engineers have successfully solved the problem of lighting the operating room by special fixtures and skylights in the world's largest and most modern hospitals.

Our Engineers will be glad to assist architects and others in applying advanced hospital lighting methods

National X-Ray Reflector Co.

"The Clearing House for Lighting Ideas"

NEW YORK
31 West 46th Street

CHICAGO
35 West Jackson Blvd.

LOS ANGELES
Pacific Finance Building

The Standard and Other Contract Documents of the American Institute of Architects

STANDARD DOCUMENTS

Agreement and General Conditions in cover	$0.20
General Conditions without Agreement	.14
Agreement without General Conditions	.05
Bond of Suretyship	.03
Form of Subcontract	.04
Letter of Acceptance of Subcontractor's Proposal	.03
Cover (heavy paper with valuable notes)	.01
Complete set in cover	.30

Complete trial set prepaid for thirty cents in stamps

OTHER CONTRACT FORMS

Form of Agreement between Owner and Architect on the Percentage Basis	$0.05
Form of Agreement between Owner and Architect on the Fee Plus Cost System	.05
Circular of Information on Fee Plus Cost System (Owner-Architect)	.03
Form of Agreement between Owner and Contractor (Cost Plus Fee Basis)	.10
Circular of Information on Cost Plus Fee System (Owner-Contractor)	.06

The American Institute recommends, without reservation, the Contract Forms named above. They are recommended to the building industry as a whole, and to the Architectural Profession regardless of Institute affiliation.

The Standard Documents, those listed first, are nationally known and used. Progressive architectural firms are discarding private forms, or local forms, and are incorporating the Institute Documents into their office practice.

All the evidence shows that the building industry is due for a prolonged period of activity. There is hardly an Architect who does not understand the significance of this to the profession as a whole, and to himself individually.

An architectural firm's reputation, based on business ability, is worth much when it becomes established among those who look for it first — the business men of the average American community. Leave no stone unused in making *thorough, incisive, correct* business methods and Contract Forms a part — a habit — of your organization.

Use the Standard and Other Contract Documents of the American Institute.

If your local dealer cannot supply the forms, order direct from the Executive Secretary, The A. I. A., The Octagon House, Washington, D. C. All orders filled the day received, transportation prepaid.

Three "House & Garden" Books

which sum up the designing of the house, the decorating and furnishing of the interior, and the development of the garden.

The Book of Houses contains 110 pages of illustrations and plans of some of the best moderate-cost homes in the country, of different styles and materials and of great variety of plan. Successful alterations are shown, and there are numerous illustrations of details such as porches, fireplaces and mantels, doorways, windows, stairways and chimneys. Price $3.

The Book of Interiors presents 126 pages of well decorated and furnished rooms; its suggestions are practical and helpful, particularly as most of the examples illustrated are of moderate cost. It deals with questions such as period styles, color schemes, lighting fixtures, furniture, floor coverings and antiques. Price $4.

The Book of Gardens shows, in 127 pages, some of the most beautiful of American gardens, chiefly those of medium extent and cost. More than 400 illustrations aid the architect or decorator in the designing of such details as fountains, pergolas and latticework or in the laying out of lawns, walks and flower borders. One of the most practical books ever published. Price $5.

Sizes 9½ x 12¾ inches

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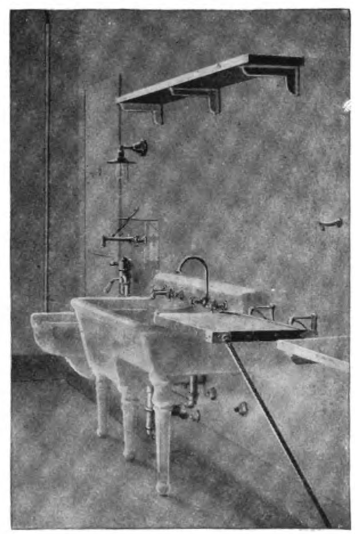

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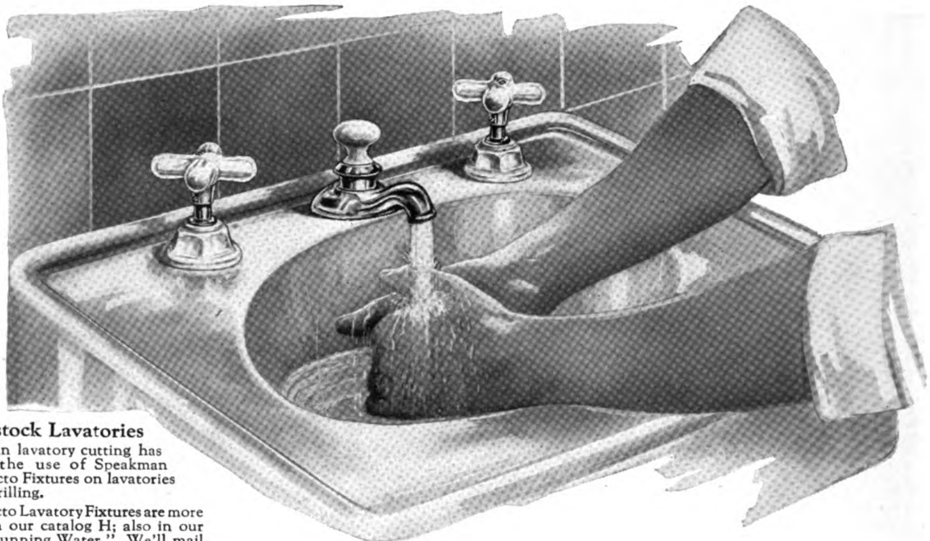

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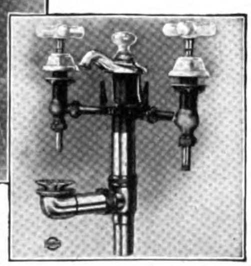

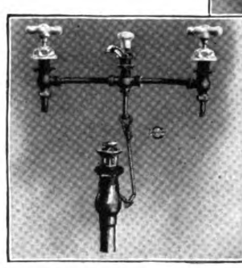

THE UNIT—*H-2266*

Solid china cross-arm handles; china escutcheons; ¼" threaded tails on valves; raised nozzle 3⅛" long; standing waste with china knob and 1¼" diameter tail.

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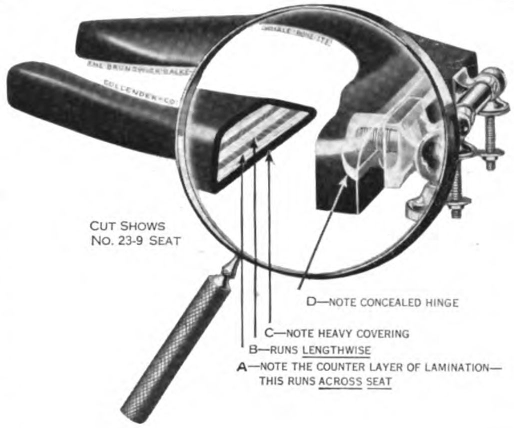
CLOSET SEATS



No. 21-9

Seat only. Fits all standard extended lip bowls. Measures 19 inches center hinge posts to front; 15½ inches wide. Hole 8 inches wide.

No. 18-59

Seat only, with No. 59 heavy nickel-plated concealed hinges, for bowls with extended lips Measures 18¾ inches posts to front of seat, 15 inches wide Front and back openings 3¼ inches wide

Whale-Bone-Ite

Toilet Seats

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Life-long Sanitary Service

not temporary and then repairs

Hospitals demand the best seat, and must be made to stand asceptic cleaning, *which causes deterioraticn in most materials but not Whale-Bone-Ite,* which is impervious, acid-proof. Pins and corset stays do not penetrate its covering.

The following Hospitals illustrated in this issue are Whale-Bone-Ite equipped:

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Saginaw Hospital, Saginaw, Mich.
Home Hospital, Lafayette, Ind.
Hackensack Hospital, Hackensack, N. J
Lying-In Hospital, Boston, Mass.
Mt. Sinai Hospital, New York City

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Manufacturers' Catalogs and Business Announcements

CATALOG REVIEW

THE HOCKADAY COMPANY, Chicago. "Paint Mileage." 55 pp., 8 x 10½ ins.

Experience has proved that of all the details of a modern building, few if any are more vital to its successful functioning than the treatment of its walls and other portions which require painting. The importance of the subject might be coupled with the fact that comparatively few architects or specification writers really understand the use of paint; a general air of mystery generally prevails regarding the use of the best paint to be specified from a great number and the correct use of what is to be used, so it is not easy to steer a safe course through the mazes of a subject which is widely misunderstood and yet which demands the correct solution of the problem if a really satisfactorily wearing structure is to be delivered to the client.

In this booklet a well known manufacturer of paint presents the case for a material which is made for a great number of purposes and which is being successfully used in a vast number of buildings of widely varying kinds. "Hockaday" is a paint for use on plaster walls of different finishes; on interior woodwork; concrete surfaces of all kinds, including floors; Keene's cement; brick, either hard or soft; wall board, burlap and canvas; metal ceilings; ironwork and hollow tile, and in fact almost any material for interior finish which requires paint which shall wear well. The use of a washable paint is highly desirable in hospitals, schools, hotels and buildings of many other kinds, for since it presents a surface which can be quickly and easily renovated by being merely washed with soap and water, it helps to reduce the costs of maintenance.

In addition to emphasizing the advantages to be desired from the use of this material, "Paint Mileage" contains complete specifications for its use on different surfaces to afford successful results.

ANNOUNCEMENTS

Louis Andre Lamoreux announces the opening of an office for the practice of architecture at 130 Mohican Bldg., Mansfield, Ohio. Manufacturers' catalogs and samples requested.

The H. H. Winner Company, bank architects and engineers, announces the removal of its offices to the Sharon Bldg., 55 New Montgomery street, San Francisco.

Ralph O. Yeager, architect, announces the opening of an office at 64 E. Van Buren street, Chicago. Manufacturers' samples and catalogs are desired.

Kirby T. Snyder, architect, has removed his office from 1221 Plymouth Bldg. to 3536 Columbus avenue, South, Minneapolis. Manufacturers' samples and catalogs are desired.

Frederic Hutchinson Porter, architect, announces the dissolution of the firm of Baerresen & Porter and his opening of offices at 222 Hynds Bldg., Cheyenne, Wyo. Manufacturers' catalogs and samples are desired.

Leslie A. Libby, architect, announces the removal of his office from 178 Middle street to Falmouth Gardens, Portland, Me.

A. C. Fehlow, architect, has removed his office from 7643 Stewart avenue to 5637 S. Justine street, Chicago.

John N. Marriott announces the removal of his offices from 301 Oppenheimer Bank Bldg. to 1001 Frost National Bank Bldg., San Antonio.

John Scott & Co., architects, have removed their offices from 2326 to 2316 Dime Bank Bldg., Detroit. C. Kenneth Bell, formerly connected with the firm, will continue as associate architect.

Herbert B. Hunter, of Washington, D. C., announces the opening of an office at High Point, N. C., for the general practice of architecture. Manufacturers' samples and catalogs requested.

S. E. Holmes and C. B. Anthony, formerly of the firm of Hatton, Holmes & Anthony, announce the formation of a partnership for the practice of architecture and engineering under the firm name of Holmes-Anthony, with offices at 307 O. R. C. Bldg., Cedar Rapids, Iowa.

Index to Advertising Announcements

Cook County Hospital, Chicago. Capacity 2700 beds. One of the finest of modern civic institutions—Wolff equipped

Chicago's Great County Hospital —a WOLFF Installation

"QUALITY throughout" is the recognized reputation of the Cook County Hospital. The equipment and educational advantages of this institution have made it much sought after by the leading internes from Chicago's medical schools. Here may be found in great variety those special hospital fixtures in Wolff Quality Ware which architects and hospital superintendents are specifying in the latest installations for convenience and time-tested serviceability.

The presence of Wolff Fixtures in this great neighboring institution only a few blocks from the Wolff plant indicates the confidence which Wolff Plumbing has earned in its home market through 67 years of satisfactory service.

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All highest quality, two-fired, real vitreous china

22″ and 24″
COMFORT No. 150

Because of the rounded front the COMFORT and PRINCESS economize space and give every utility advantage of larger lavatories.

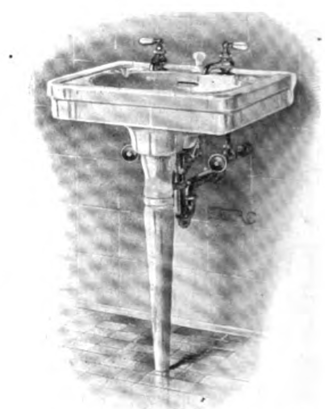
The cost is much lower.

20″ PRINCESS No. 170

18″ x 20″ AINSLEE No. 268

The AINSLEE is the logical 18″ x 20″ lavatory. It saves about one third of the cost.

The 22″ MAYWOOD has a bowl the same as in the 24″ size and fills every purpose of the larger size. The saving in space and cost is considerable.



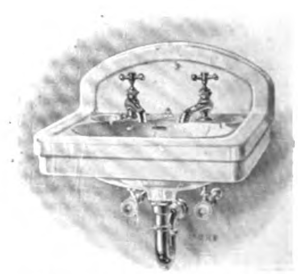
17″ x 22″ MAYWOOD No. 210

The cost of the ALMA is little more than half that of the square pattern.

There are but few cases where it will not serve as well.

18″ x 20″ ALMA No. 190

The LYNDON is an equal of the 18″ x 20″ size in all essential points and costs little more than half as much.



15″ x 18″ LYNDON No. 252

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